

## New taxa of *Acacia* (Leguminosae: Mimosoideae) and notes on other species from the Pilbara and adjacent desert regions of Western Australia

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### Abstract

Maslin, B.R. & van Leeuwen, S. New taxa of *Acacia* (Leguminosae: Mimosoideae) and notes on other species from the Pilbara and adjacent desert regions of Western Australia. *Nuytsia* 18: 139–188 (2008). Preparatory to publishing books on the *Acacia* Mill. flora of the Pilbara region, 10 new species (*A. bromilowiana* Maslin, *A. fecunda* Maslin, *A. leeuweniana* Maslin, *A. minutissima* Maslin, *A. subcontorta* Maslin, *A. subtiliformis* Maslin, *A. trudgeniana* Maslin, *A. robeorum* Maslin, *A. thoma* Maslin and *A. walkeri* Maslin) and two new subspecies (*A. catenulata* C.T.White subsp. *occidentalis* Maslin and *A. steedmanii* Maiden & Blakely subsp. *borealis* Maslin) are described. *Acacia coriacea* DC. is now more narrowly circumscribed to include subsp. *coriacea* and subsp. *pendens* R.S.Cowan & Maslin only, while the former *A. coriacea* subsp. *sericophylla* (F.Muell.) R.S.Cowan & Maslin has been reinstated as a distinct species (*A. sericophylla* F. Muell.). Notes on the variation in Western Australian plants of *A. drepanocarpa* F.Muell. are provided. *Acacia bromilowiana*, *A. fecunda* and *A. subtiliformis* are Priority Three taxa and *A. leeuweniana* is a Priority One taxon according to the Department of Environment and Conservation's Conservation Codes for the Western Australian Flora.

### Introduction

The 12 new taxa of *Acacia* Mill. described here are the result of study conducted in the Pilbara region over the past five years. The aim of this study is the production of an identification guide to the *Acacia* flora of the Pilbara region (Maslin & van Leeuwen, in prep.) in order to facilitate the appreciation and use of these species in land management, nature conservation, rehabilitation and sustainable utilisation. *Acacia* species dominate many Pilbara ecosystems and apart from being important in nature conservation programs and in mine site and other land rehabilitation programs, some provide a source of fodder for the pastoral industry especially during drought times while others have ethnobotanical and cultural significance to the local indigenous people of the region.

As used here the term Pilbara Region corresponds to the Fortescue Botanical District as defined by Beard (1980), which essentially conforms to the 193,105 km<sup>2</sup> Pilbara Region as defined in the Interim Biogeographic Regionalisation for Australia (Environment Australia 2000). Perhaps the most well-known and distinctive natural feature of the Pilbara is the Hamersley Range which is a series of ranges, ridges, hills and plateaux extending from near Pannawonica in the west to east of Newman. The Hamersley Range contains Western Australia's highest mountain, Mt Meharry (1,245 m), and is

made up of numerous small ranges such as the Ophthalmia, Hancock, Western Packsaddle, Lowloit and Werribee Ranges.

The region is a mountainous landscape underlain by the Archaean granites of the Pilbara Block. In the north the region comprises undulating granitic and basaltic ranges (e.g. the Chichester Range) interspersed by extensive alluvial river flats and colluvial plains of decomposing basalt and granite. In the south the Pilbara Block is overlain by Proterozoic sedimentary banded ironstone ranges and plateaux (e.g. the Hamersley Range) which are heavily dissected by gorges and drainage features and accompanied by basalt and dolerite intrusions. In the west the region comprises an extensive alluvial plain (e.g. the Roebourne Plain) supporting river flats while in the east the mountainous topography and rocky pediments acquiesce to the rolling dunefield and sand plains of the Little Sandy and Great Sandy Deserts. The soils of the region are predominately red pediments that are skeletal, shallow, stony, underlain by a hardpan and usually covered by a surface mantle of pebbles and cobbles. Heavy clays and gilgais are associated with some river flats, drainage basins and basaltic plains while alluvial deposits predominate on the coastal plain and associated river deltas and flats. Aeolian sand plains and small isolated dunes occur along the eastern and southern fringes of the region.

The climate of the Pilbara is arid tropical with highly variable summer rainfall, particularly in the south. Annual rainfall averages 250–300 mm which is up to 12 times less than evaporation (Bureau of Meteorology 2006). Cyclonic activity is significant, with several systems affecting the coast and hinterland annually.

The vegetation of the Pilbara is best described as a tree or shrub steppe where *Acacia* and *Triodia* are the dominant elements (Beard 1990). Eucalypts are also a conspicuous element in many communities. The vegetation is complex and varied and influenced noticeably by geology and fire history. Grasslands range from extensive annual bunch grass (*Aristida*, *Enneapogon*) flats or perennial tussock grass (*Eriachne*, *Chrysopogon*) plains on the coast through to Mitchell Grass (*Astrebela*) flats on some river washes to rolling hummock grass ('Spinifex' - *Triodia*) plains on stony hills, ranges and aeolian sand plains. Shrublands dominate the Pilbara landscape with *Acacia* and *Senna* species being the obvious elements although to the south of the region *Eremophila* species become conspicuous. Occasionally, samphire heaths (*Tecticornia*, *Frankenia*, *Rhagodia*) dominate, especially along the mangal fringed coast and on large internal drainage basins (e.g. Fortescue Marsh). Woodlands, in particular Mulga (*Acacia aneura sens. lat.*) woodlands, are dominant throughout the Hamersley Range and into the Fortescue Valley whereas *Eucalyptus* woodlands (*E. camaldulensis*, *E. victrix*) fringe most drainage features in the region and where surface water is plentiful forests of River Red Gum (*E. camaldulensis*) and Cadjeput (*Melaleuca argentea*) are a common occurrence. Uniformly sparse occurrences of eucalypts (*Eucalyptus leucophloia*, *Corymbia hamersleyana*) occur across the landscape particularly as emergent elements from 'Spinifex' grasslands. Unusual vegetation types include palm (*Livistona alfreddii*) communities on freshwater springs and mallee shrublands on the summits of mountains within the Hamersley Range. The Pilbara region has a known flora approaching 2,100 taxa (Paczkowska & Chapman 2000). Floristically the region has a typically arid zone flora with most eremaeon elements being present, in particular *Acacia*, *Senna*, *Sida*, *Hibiscus*, *Ptilotus* and a preponderance of Poaceae, Malvaceae, Amaranthaceae and Goodeniaceae. Floristic elements of the tropical north (*Brachychiton*, *Terminalia*) and the mesic south (*Daviesia*, *Thysanotus*, *Hibbertia*) are also present. The Pilbara is phytogeographically important for being within the transition zone from tropical grasslands to the north and *Acacia* shrubland/woodlands to the south (*Triodia* - *Acacia* line – Beard 1975). This feature is exemplified by the preponderance of 'Spinifex' and wattles in the region and in the Hamersley Range it is exemplified by the juxtaposition of extensive fire sensitive Mulga woodland underlain by a fire-prone 'Spinifex' understorey.

The Pilbara represents a secondary centre of species richness for *Acacia* in Western Australia (Hnatiuk & Maslin 1988) with 118 taxa recorded for the region (Web reference 1). This number includes 83 species (some comprising two or more infraspecific taxa), 21 hybrids or putative hybrids and seven taxa of uncertain taxonomic status (many of these are known from only a single gathering and may well represent hybrids).

Twelve new taxa of *Acacia* from the Pilbara are described below as a result of the present study. The numbers of species (excluding hybrids and taxa of uncertain status) known to occur in the Pilbara has increased by about 50% over the past 25 years; in 1982 there were 54 recorded for the region (Maslin 1982). A more detailed discussion of the Pilbara *Acacia* flora will be published elsewhere (Maslin & van Leeuwen, in prep.).

It should be noted that the type of *Acacia* was recently changed from the African/Asian species *A. scorpioides* (L.) W.F. Wight (= *A. nilotica* (L.) Delile), to the Australian species *A. penninervis* DC. (McNeill 2006). One of the consequences of this action is that the name *Acacia* subg. *Acacia* now applies to the 'Australian group' of wattles formerly called *Acacia* subg. *Phyllodineae* DC. (Maslin 2008). Similarly the former section *Phyllodineae* DC. becomes section *Acacia*. This new nomenclature is adopted in the present paper.

Photographs of all the taxa described here are presented on the WorldWideWattle website at [www.worldwidewattle.com](http://www.worldwidewattle.com). A key to the Pilbara acacias, accompanied by descriptions, illustrations and photographs will be presented in Maslin and van Leeuwen (in prep.).

## Taxonomy

### *Acacia bromilowiana* Maslin, *sp. nov.*

Arbores vel frutices erecti gangliiformes 2–5(–6.5) m alti, aliquando ad 12 m; *caules* principales 1 vel 2, sub-recti vel aliquantum curvati, raro (Balfour Downs Station) tholiformes et effusi. *Cortex* longitudinaliter fisuratus, fibrosus (in laciniis longis exutus). *Ramuli* glabri, rubelli interdum pruinosi. *Surculi novi* strato micro-pilis densis ferruginis ornati. *Phyllodia* asymmetricaliter lanceolata vel anguste elliptica, (8–)10–14(–18) cm longa, (13–)20–40(–45) mm lata, coriacea, griseo-viridia aut glauca (surculis novis virentibus), subtilitissima multi-striata, anastomosibus paucis; *pulvinus* saepe obscure rubellus. *Inflorescentiae* plerumque racemorum brevi-binatorum, 5–15 mm longae; *pedunculi* 5–15(–20) mm longi, glabri; *spicae* 25–45 mm longae, vivide pallido aureae, dense floriferae. *Flores* 5-meri; *calyx* longitudine 2/5–3/4 corollae, breviter dissectus; *petala* glabra. *Legumina* (pauca visa) anguste oblonga, plana, 2–7 cm longa, 7–10 mm lata, papyracea, glabra, luteola. *Semina* (pauca visa) in legumino transverse posita; *funiculum* applanatum, cremeo album; *arillus* parvus, sub-terminalis.

*Typus*: Hamersley Range, Western Australia [precise locality withheld for conservation reasons], 3 July 2006, E. Thoma 1100 (*holo*: PERTH 07418930; *iso*: CANB, G, K, MEL, NSW).

*Acacia* sp. (M.E.T. 584), in Trudgen, M.E. (1984).

Gnarled and normally erect *shrubs* or *trees* commonly 2–5(–6.5) m tall with diameter breast height to c. 12 cm, occasionally (in very favourable sites) 10–12 m tall with diameter breast height to c. 30 cm, with 1 or 2 sub-straight to somewhat crooked main stems that branch at c. 1 m or more above the ground,



the crown dense, rarely (on Balfour Downs Station) domed sprawling shrubs 1–2 × 3–4 m with crown extending to the ground, sometimes clonal (see *Variation* below). *Bark* grey to black, longitudinally fissured and fibrous (peeling off in long strips) on main stems and upper branches. *Branchlets* terete, very obscurely ribbed, glabrous, reddish, sometimes pruinose. *New shoots* invested with a dense layer of ferruginous microscopic hairs when first initiated but soon becoming glabrous and green or lightly pruinose. *Phyllodes* asymmetrically lanceolate to narrowly elliptic, broadest near or below the middle, lower margin ± straight to shallowly concave, upper margin convex, (8–)10–14(–18) cm long, (13–)20–40(–45) mm wide, coriaceous, straight to shallowly falcately recurved, slightly undulate when very broad, glabrous, grey-green to sub-glaucous or glaucous (except young shoots); very finely longitudinally multistriate, the *nerves* parallel with a few anastomosing, close together, 3–5 slightly more pronounced than the rest and none confluent with the margin at the base; *apices* sub-acute to obtuse, not pungent; *pulvinus* (2–)3–6(–8) mm long, smooth or shallowly transversely to longitudinally wrinkled, normally with a few low-profile longitudinal ridges when dry, dull reddish or reddish brown (? sometimes yellow – see discussion below). *Gland* inconspicuous, situated on upper margin of phyllode 0–2 mm above pulvinus. *Inflorescence* normally a single binate raceme 5–15 mm long, a few rarely with 4 spikes and to 35 mm long, sometimes growing out at apex with subsequent inflorescences single and simple (i.e. not racemose) within axil of phyllodes, raceme axes compressed and glabrous; *peduncles* 5–15(–20) mm long, glabrous; *receptacles* glabrous, sometimes longitudinally rugose when dry, invested with short emergent processes near flower scars when in fruit (but only one fruiting sample seen); *spikes* 25–45 mm long and 9–10 mm wide, bright light golden, flowers close together to form a dense spike. *Bracteoles* 1–1.5 mm long, claws linear, ciliolate and pale coloured, laminae ovate, inflexed, small (c. 1 mm long), light brown and acute to apiculate. *Flowers* 5-merous, 2 mm long; *calyx* 2/5–3/4 length of corolla, shortly dissected into oblong, inflexed lobes which are thickened abaxially, the tube sparsely to moderately puberulous, truncate at base; *petals* glabrous, nerveless. *Pods* (few seen) narrowly oblong, flat, scarcely raised over seeds, straight-edged or very slightly constricted between seeds, 2–7 cm long, 7–10 mm wide, papery, glabrous, yellowish, nerveless or very obscurely nerved. *Seeds* (few seen) transverse or longitudinal in the pods, ovoid, 3.5–4 mm long, 2.5–3 mm wide, slightly shiny, brown; *pleurogram* very indistinct, widely ‘u’-shaped; *funicle* flattened, creamy white, expanded into a small sub-terminal *aril*. (Figure 1)

*Characteristic features.* Gnarled, normally erect *shrubs* or *trees* with 1 or 2 sub-straight to somewhat crooked main stems, rarely (on Balfour Downs Station) domed and sprawling shrubs. *Bark* longitudinally fissured and fibrous (peeling in long strips) on main stems and upper branches. *Branchlets* glabrous, reddish, sometimes pruinose. *New shoots* with a dense layer of ferruginous microscopic hairs when first initiated. *Phyllodes* asymmetrically lanceolate to narrowly elliptic, broad (normally 2 cm or more wide), coriaceous, grey-green to glaucous (green on new shoots), very finely multistriate with few anastomoses; *pulvinus* mostly 3–6 mm long, often dull reddish or reddish brown, smooth or finely wrinkled. *Inflorescences* normally short binate racemes 5–15 mm long; *peduncles* 5–15(–20) mm long glabrous; *spikes* long and densely flowered. *Pods* (few seen) narrowly oblong, flat, papery, glabrous, yellowish. *Seeds* (few seen) transverse or longitudinal in the pods, brown; *funicle* flattened, creamy white, expanded into a small sub-terminal *aril*.

*Selected specimens examined.* WESTERN AUSTRALIA [precise localities withheld for conservation reasons]: Hamersley Range: 4 Oct. 2006, *B. Bromilows.n.* (CANB, K, MEL, NSW, PERTH 07375107); 2 June 2006, *B.R. Maslin* 8784 (PERTH); 6 July 2006, *E. Thoma* 1024 (AD, NT, PERTH); 1 Aug. 2006, *E. Thoma* 1025 (PERTH); 14 July 1997, *M.E. Trudgen* 16163 (PERTH) and 16164 (CANB, K, MEL, NSW, NY, PERTH); 23 May 1991, *S. van Leeuwen* 762 (PERTH); 16 Aug. 1992, *S. van Leeuwen* 1300 (PERTH); 1 Aug. 1998, *S. van Leeuwen* 3571 (PERTH); 6 Aug. 1998, *S. van Leeuwen* 3643 (PERTH); 1 Oct. 1998, *S. van Leeuwen* 4231 (PERTH). Balfour Downs Station: 29 June 1996, *A.L. Payne* PRP 1371 (PERTH); 13 Aug. 2006, *B.R. Maslin* 8871 (MEL, PERTH).





Figure 1. Holotype of *Acacia bromilowiana* Maslin (PERTH 07418930), scale = 5 cm.

*Distribution and ecology.* Known only from a few disjunct hilltop populations in the Hamersley Range where it extends from Tom Price through Ophthalmia and Hancock Ranges to Newman, and also from Balfour Downs Station, about 150 km north-east of Newman. A similar disjunction between the Hamersley - Ophthalmia Ranges and the Balfour Downs area occurs also in *A. subcontorta* Maslin and *A. catenulata* C.White subsp. *occidentalis* Maslin (see below). *Acacia bromilowiana* grows in skeletal stony loam typically high in the landscape. The Hamersley Range populations occur on steep slopes, ridge tops and breakaways (often in gullies and sheltered places) that comprise a substrate of banded ironstone (Hamersley Group – Brockman Iron Ore Formation) or massive basalts (Jerrinah Formation – Fortescue Group). These localities are dominated by very open low eucalypt woodlands (*Eucalyptus leucophloia*, *Corymbia hamersleyana*) over ‘Spinifex’ (e.g. *Triodia pungens*, *T. wiseana*). On Balfour Downs Station the species occurs as a series of disjunct populations over a ten kilometre range where it forms monotypic stands in skeletal loamy soil, on the dissected slopes of low ferruginous breakaways of the Billygoat Land System (Van Vreeswyk *et al.* 2004). In these Balfour Downs populations there is limited litter or ‘Spinifex’ between plants and thus they are afforded protection from fire which probably accounts for their presumed old age.

*Flowering and fruiting period.* Flowering commences in early July and continues until about mid-August. A number of collectors (e.g. Trudgen & Casson 1998) have commented on the large numbers of inflorescence spikes found on the ground under the plants during the flowering period, the peduncles having abscised from the racemes soon after anthesis commences. Mature pods occur from about September to October (few pods have been seen which makes it difficult to accurately determine the fruiting phenology).

*Conservation status.* Listed as Priority Three under the Department of Environment and Conservation's (DEC) Conservation Codes for Western Australian Flora (Atkins 2008).

*Etymology.* This species is named for Robert (Bob) Neil Bromilow, who, as Technical Officer to Stephen van Leeuwen (see *A. leeuweniana* below) provided excellent field and laboratory assistance over 17 years in the Pilbara. The support provided by Bob was pivotal in the completion of several large scale botanical surveys, the most noteworthy being the ‘Botanical Survey of Hamersley Range Uplands’, ‘Biological Survey of the South-western Little Sandy Desert’ and the current ‘Pilbara Biological Survey’. Bob was also instrumental in maintaining and curating the collection at the now disbanded Pilbara Regional Herbarium in Karratha.

*Common name.* Bromilow’s Wattle (suggested new common name).

*Affinities.* *Acacia bromilowiana* belongs to *Acacia* sect. *Juliflorae* (Benth.) C.Moore & Betche and appears to be most closely related to *A. hamersleyensis* Maslin with which it often grows. *Acacia hamersleyensis*, however, is often a multi-stemmed shrub (oldest plants rarely assuming a gnarled spreading habit somewhat similar to some forms of *A. bromilowiana*) which is readily distinguished from the new species by its simple (not racemose) inflorescences, hairy peduncles and pods (glabrous in *A. bromilowiana*), sericeous new shoots with pale yellow or silvery appressed hairs (the distinctive layer of dense, red-brown minute hairs that occur on young new shoots of *A. bromilowiana* is absent) and its seeds which are oblique (not transverse or longitudinal) in the pods and which have a band of dull yellow tissue surrounding the small central areole (this band of tissue is absent in *A. bromilowiana*). Other characters useful in recognizing *A. hamersleyensis* include its yellowish to light brown or orange branchlets (seemingly always reddish in *A. bromilowiana*), normally narrower phyllodes which only rarely exceed 20 mm in width and which never have anastomosing nerves (careful examination of phyllodes at  $\times 10$  magnification or higher is needed to observe the relatively few anastomoses that occur on the phyllodes of *A. bromilowiana*), its commonly shorter peduncles (3–7 mm long) and its

often longer (mostly (4–)5–10 mm long), more slender and more coarsely wrinkled, orange or yellow pulvinus.

*Variation.* *Acacia bromilowiana* shows considerable variation in its growth characteristics. In the Hamersley Range it is normally an erect shrub or small tree 2–5(–6.5) m tall with one, or sometimes two, rather crooked main stems and a dense crown that occupies the upper half of the plant; in the Hancock Range, however, plants from a small, sheltered gully attained a height of 12 m. It is assumed that this tall stature has resulted from the population escaping the ravages of fire for a considerable length of time. On Balfour Downs Station (at the eastern extremity of the known geographic range of the species) the plants are similarly protected from fire (see *Distribution and ecology* above) but in this case they grow as low-domed shrubs 1–2 m tall, with thick, gnarled and twisted trunks and spreading crowns that extend to the ground.

On most plants the phyllodes vary from 2–4 cm wide, however, on one gathering from the Ophthalmia Range (*S. van Leeuwen* 4231) they were atypically narrow, ranging down to about 13 mm wide. Some collectors have noted that on living plants the pulvinus is reddish in colour (but normally drying brownish), however, on some herbarium material the pulvinus is yellowish.

Judging from field observations it appears that most (perhaps all) occurrences of *A. bromilowiana* in the Hamersley Range represent a series of clonal populations. To test this notion a small, preliminary genetic investigation using RAPD markers was undertaken by M. Byrne (pers. comm.), based on plants collected by M. Trudgen from two populations near West Angelas in the Hamersley Range. The results from this study showed there to be no genetic variation within either of the populations, suggesting that they were indeed clonal clumps. However, plants on Balfour Downs Station appear not to be clonal, although they have not been tested genetically.

***Acacia catenulata* C.T.White subsp. *occidentalis* Maslin, *subsp. nov.***

*Frutices* grandi rotundati, in statu maturo abores obconicae vel effusae et bene formatae 3–8(–10) m altae, ab subsp. *catenulatae* imprimis differt: truncis non striatis, surculis novis primo dense argillaceis vel pallido luteo sericeis, indumento sparso in statu aetate. In regionis Pilbara, Western Australia, limitato.

*Typus:* 24 km west-south-west of The Governor, Hamersley Ranges, 26 September 1997, *M. Trudgen* 18388 (*holo:* PERTH 06695582; *iso:* K).

Dense, rounded large *shrubs* maturing to obconic or spreading shapely *trees* 3–8(–10) m tall, with a single trunk or having a few trunks (up to about 4) arising from ground level, trunks (and branches) not fluted, with wide-spreading (patent to ascending) lateral branches along main trunks from near ground level (these branches persist, even after they have died, until the plants are very mature), the crowns bushy, often rounded and up to 3–4(–5) m across. *Bark* mid-grey to black, longitudinally fissured and fibrous on main trunks, smooth on branches. *Branchlets* light brown or orange extremities, glabrous except minutely appressed-hairy at ends of at least the young branchlets (observe at  $\times 10$  magnification), the hairs straight, silvery white and becoming sparser with age. *New shoots* densely sericeous, the hairs silvery or pale citron when first initiated, silvery and becoming sparser with age. *Phyllodes* variable, narrowly elliptic or oblong-elliptic to linear-elliptic, occasionally narrowly lanceolate, (4.5–)6–11 cm long, (3–)4–8(–12) mm wide (the shortest and broadest phyllodes appear to occur on young plants),



not rigid, wide-spreading, sometimes straight but more typically shallowly to moderately falcately recurved, occasionally imperfectly sigmoid, invested with a sparse to moderately dense layer of minute (difficult to see without magnification), closely appressed, straight, silvery-white hairs which become progressively sparser with age (absent from oldest phyllodes), mid- to dark-green (with a slight silvery sheen) to distinctly sub-glaucous or dull greyish green; very finely multi-nerved, the *nerves* longitudinal, parallel (longitudinal anastomoses very infrequent) and close together, the midrib and sometimes a nerve on either side of it slightly more pronounced than the rest; *marginal nerve* not prominent, very narrow, yellow or occasionally light brown (at least when dry) and not resinous; *apices* acute; *pulvinus* 2–3 mm long, finely transversely wrinkled and yellow to brown when dry. *Gland* very obscure, situated on upper margin of phyllode 0–2 mm above pulvinus, lamina not or only slightly swollen about the gland. *Inflorescences* simple or rudimentary racemes, *peduncles* normally 2 per axil with a rudimentary vegetative bud within their angle at anthesis, 2–7 mm long, moderately to densely hairy, sometimes glabrous in fruit, hairs appressed or  $\pm$  spreading; *receptacle* glabrous or sparsely puberulous (hairs white,  $\pm$  patent); *spikes* 8–15 mm long (when dry), presumably golden, the flowers rather close together. *Bracteoles* sub-peltate. *Flowers* 5-merous, small; *sepals* linear-spathulate, free to base, about half the length of petals; *petals* 1.2 mm long, glabrous, very obscurely 1-nerved; *ovary* densely silvery appressed-hairy. *Pods* flattened (scarcely raised over the seeds), deeply constricted between seeds, fragile and readily breaking into 1-seeded oblong-elliptic articles at the constrictions, 20–50 mm long, 4–6(–8) mm wide, thinly coriaceous-crustaceous, glabrous or sometimes minutely appressed hairy at constrictions, openly reticulate (nerves raised, at least when dry), stipitate. *Seeds* longitudinal in the pods, ellipsoid to obloid-ellipsoid, 3.5–5 mm long, 2–3 mm wide, flattened (c. 1 mm thick), dark brown, seed coat thin; *areole* very small and inconspicuous; *funicle* filiform,  $\pm$  exarillate or expanded into a very small, terminal *aril*. (Figure 2)

*Characteristic features.* Dense, rounded large *shrubs* maturing to obconic or spreading shapely *trees*, trunks not fluted, with wide-spreading lateral branches along main trunks from near ground level and persisting until plants quite mature. *Branchlets* glabrous except minutely appressed-hairy at ends of at least the young branchlets. *New shoots* densely sericeous (hairs silvery or pale citron) when first initiated. *Phyllodes* narrowly elliptic or oblong-elliptic to linear-elliptic, occasionally narrowly lanceolate, sometimes straight but more typically shallowly to moderately falcately recurved, occasionally imperfectly sigmoid, not rigid, microscopically appressed-hairy but ageing glabrous, very finely longitudinally multistriate with nerves parallel and close together, marginal nerve not pronounced. *Inflorescences* simple or rudimentary racemes; *peduncles* short (2–7 mm long), hairy (except sometimes glabrous when in fruit); *spikes* short (8–15 mm long). *Sepals* free. *Pods* deeply constricted between seeds and readily breaking into 1-seeded, oblong-elliptic articles at the constrictions, flat, thinly coriaceous-crustaceous, glabrous (sometimes minutely appressed hairy at constrictions), openly reticulate. *Seeds* flat, seed coat thin and not especially hard, the *funicle* filiform and not or scarcely expanded into an *aril*.

*Selected specimens examined.* WESTERN AUSTRALIA: west of Rhodes Ridge, 10 Feb. 1988, J.E.D. Fox A7005 (PERTH); 31 km E of Newman on road to Port Hedland, 28 June 1993, B.R. Maslin 7234 (MEL, PERTH); Ethel Creek Station, 31 May 2004, B.R. Maslin 8527 (PERTH); Balfour Downs Station, 1 June 2004, B.R. Maslin 8536 (PERTH); 25.1 km NW of Newman (on new Great Northern Highway, Ophthalmia Ranges), 22 Oct. 1988, L. Thomson LXT 1130E (PERTH); 13.25 km SSW of Mt Hilditch, Hamersley Ranges, 27 Sep. 1999, M. Trudgen MET 18384 (PERTH); 2.5 km SSW of The Governor, 4.6 km NE of Coondewanna Hill, 18 Sep. 1991, S. van Leeuwen 1050 (NSW, PERTH); 2.7 km SSW of The Governor, 9 km SW of Mt Robinson, 5 km NNW of Padtherung Hill, 14 May 1992, S. van Leeuwen 1178 (K, PERTH); Ore Body 24, Ophthalmia Range, eastern end of Hamersley Range, 20.9 km E of Mt Newman, 27.6 km W of Shovelanna Hill, 15 km NNW of Newman Airport, 20 Aug. 1998, S. van Leeuwen 3831 (CANB, PERTH).





*Distribution and ecology.* Confined to the Pilbara region, Western Australia, where it extends from the central Hamersley Range (around West Angelas) eastwards through the Ophthalmia and Hancock Ranges to Newman; it also occurs on Balfour Downs Station (about 150 km north-east of Newman) and on the old Great Northern Highway between Newman and Nullagine, just north of the Fortescue River on Roy Hill Station. A similar disjunction between the Hamersley Range and the Balfour Downs area occurs also in *A. bromilowiana* (see above) and *A. subcontorta* (see below). It forms dense populations in many places where it occurs (regeneration from seed), especially on the Wanna Munna Flats to the north of Giles Point in the Ophthalmia Range and in the Ethel Creek–Balfour Downs Station area. Occurs on red-brown hardpan flat or gently undulating terrain along diffuse watercourses or colluvial fans, sometimes extending to dry low rocky hills or ridges. It grows on (stony) shallow red-brown sandy loam, clay-loam, deep red loamy duplex soils or self-mulching cracking clays in open to moderately closed Low Woodlands of *Eucalyptus victrix* and/or with Mulga in the Boolgeeda, Wanna Munna and Coolibah Land Systems (Van Vreeswyk *et al.* 2004).

*Flowering and fruiting period.* Paucity of flowering and fruiting specimens makes it difficult to accurately determine the phenology of the subspecies. It appears to flower in response to rainfall between December and June, however, not all plants in given populations produce flowers during this period. Pods with mature seeds have been collected between August and October.

*Conservation status.* Not considered rare or endangered. However, it is noted that this species is not currently recorded from the Western Australian conservation estate, but significant populations do occur within the proposed Mulgalands Conservation Park between Karijini National Park and Newman.

*Etymology.* The subspecies name is derived from the Latin *occidentalis* (west, western) in allusion to the geographic location of this taxon relative to the typical subspecies.

*Common name.* Western Bendee (suggested new common name); the typical subspecies is called Bendee in Queensland. Some Pilbara collectors have referred to this taxon as Black Mulga but this common name is used for a number of Australian Wattles.

*Affinities.* *Acacia catenulata* belongs to *Acacia* sect. *Juliflorae* and is a very distinctive species on account of its flat, thin-textured, reticulately nerved pods which readily break into 1-seeded segments at the deep constrictions between the seeds. The typical subspecies which occurs in central Queensland with an outlier in north-east Northern Territory is distinguished most readily from subsp. *occidentalis* in having fluted trunks (Pedley 1973, 1978) and resinous,  $\pm$  sparsely appressed-hairy new shoots which are dark coloured (brownish) when dry. Very few herbarium specimens of subsp. *catenulata* have been seen, nor has the taxon been inspected in the field.

While the pods of subsp. *occidentalis*, which readily break into 1-seeded articles at the constrictions between the seeds, readily distinguish this subspecies from all other Pilbara wattles, sterile or flowering plants may possibly sometimes be confused with either *A. distans* Maslin or *A. subcontorta* Maslin (see below). Apart from the pods, *A. distans* can be recognized by having much longer, interrupted flowering spikes (3–7(–11) cm long) and phyllodes which tend to have a denser indumentum of slightly longer hairs, and *A. subcontorta* by its  $\pm$  contorted and horizontally spreading branches, generally longer spikes, partially united sepals and its generally straighter and narrower phyllodes with often red margins. *Acacia subcontorta* and *A. catenulata* subsp. *occidentalis* are sympatric on the Wanna Munna Flats near Giles Point in the Ophthalmia Range and in the absence of pods care needs to be taken not to confuse the two. Along Jigalong Creek east of the Ethel Creek Station homestead *A. distans* and *A. catenulata* subsp. *occidentalis* are sympatric, although the latter tends to occupy micro-relief



positions higher on the alluvial plain. A putative hybrid between *A. aneura* F.Muell. ex Benth. and *A. catenulata* subsp. *occidentalis* occurs between Newman and Jiggalong.

*Notes.* This species is generally killed under hot fire conditions. However, lightly scorched plants or those burnt under cool fire conditions resprout from the crown, along main stems and branches or from the trunk just below ground level.

***Acacia coriacea* and *A. sericophylla***

Cowan and Maslin (1993) recognizes three subspecies within *A. coriacea* DC.: subsp. *coriacea*, subsp. *pendens* R.S.Cowan & Maslin and subsp. *sericophylla* (F.Muell.) R.S.Cowan & Maslin. These three taxa all occur in the Pilbara, the first two confined to the region and its immediate surrounds, the last extending eastwards through the arid zone to Northern Territory, South Australia, Queensland and New South Wales. Although it was known at the time that subsp. *sericophylla* differed from the other two subspecies in a number of important ways, Cowan and Maslin (1993) attributed subspecific rank to this taxon because it was considered that this approach best served the practical needs of users by enabling them to put names on collections of herbarium material. However, with the benefit of extensive field work in the Pilbara it has become untenable to maintain the Cowan and Maslin classification. The three taxa each have very distinctive field facies and a more biologically meaningful classification is to reinstate *A. coriacea* subsp. *sericophylla* as a distinct species, *A. sericophylla* F.Muell., and to regard *A. coriacea* as comprising two subspecies, subsp. *coriacea* and subsp. *pendens*. The most obvious and reliable character that distinguishes *A. coriacea* from *A. sericophylla* is the bark, however, growth form and habitat differences also uniquely identify each species and subspecies. There are phyllode, peduncle and pod characters that can be helpful in distinguishing the taxa, but these characters are not always reliable. Therefore, identification of Pilbara specimens based on herbarium material can sometimes be problematic, unless the collector has noted where the plant grew, its growth form and most importantly, its type of bark.

The following key to *A. sericophylla* and the two subspecies of *A. coriacea* will enable most plants referable to these taxa to be identified.

- 1. Bark thick and corky, yellow and spongy internally; peduncles (8–)10–20(–30) mm long; pods (prior to dehiscence) straight to shallowly or strongly curved (not irregularly or markedly coiled); phyllodes mostly 1–4(–7) mm wide; ± gnarled trees or sub-trees with non-pendulous branchlets. ‘Spinifex’ sandplains. (W.A., N.T., S.A., Qld, N.S.W.) ..... ***A. sericophylla***
- 1: Bark thin, fibrous and longitudinally fissured; peduncles 3–10(–12) mm long; pods (prior to dehiscence) markedly and often irregularly curved, twisted and/or openly coiled, sometimes (in subsp. *coriacea*) openly curved and not twisted or coiled; (northwest W.A.)..... **2**
- 2. Dense, spreading shrubs or small trees 1–3(–4) m tall, occasionally prostrate; branchlets and phyllodes not pendulous; phyllodes 2–7(–8) mm wide, straight to shallowly or moderately recurved. Coastal dunes..... ***A. coriacea* subsp. *coriacea***
- 2: Shapely trees mostly 3–10 m tall; branchlets and phyllodes normally gracefully pendulous or sub-pendulous; phyllodes 1–4 mm wide, shallowly to strongly recurved or sometimes shallowly serpentinous. Inland from the coast, normally along watercourses..... ***A. coriacea* subsp. *pendens***

**Acacia sericophylla** F.Muell., *J. Proc. Linn. Soc., Bot.* 3: 122 (1859).

*Acacia coriacea* subsp. *sericophylla* Cowan & Maslin, *Nuytsia* 9: 87 (1993); *Racosperma coriaceum* subsp. *sericophyllum* (F.Muell.) Pedley, *Austrobaileya* 6(3): 458 (2003). *Type*: Desert along the Suttor River, Qld, without date, *F.Mueller s.n. (holo: ?MEL n.v.; iso: K)*.

*Acacia coriacea* var. *angustior* Maiden, *Forest Fl. New South Wales* 7: 154, pl. 242U (1920). *Syntypes*: Beta, Qld, June 1913, *J.L. Boorman* (NSW183183); Prairie, 30 miles [48 km] E of Hughenden, Qld, 1 September 1913, *R.H. Cambage* 3961 (NSW); Prairie, Qld, September 1918, *J.R. Chisholm* (NSW183181); New Angledool, N.S.W., February 1900, *A. Paddison* (NSW183180).

**Acacia coriacea** DC., *Prodr.* 2: 451 (1825); *Mem. Legum.* pt. 8, 446 (1827).

*Racosperma coriaceum* (DC.) Pedley, *J. Linn. Soc., Bot.* 92: 248 (1986). *Lecto*: Western Australia (sphalm. 'Nouvelle Holland. cote orient.'), [June – July 1801, N. Baudin Expedition] (G-DC, fruiting specimen, *vide* R.S. Cowan & B.R. Maslin, *Nuytsia* 9: 84 (1993); *isolecto*: K, P; *paralecto*: flowering specimen on type sheet (G-DC, P).

**Acacia coriacea** subsp. **coriacea**, *Nuytsia* 9: 85 (1993).

**Acacia coriacea** subsp. **pendens** R.S.Cowan & Maslin, *Nuytsia* 9: 86 (1993).

*Racosperma coriaceum* subsp. *pendens* (R.S.Cowan & Maslin) Pedley, *Austrobaileya* 6(3): 458 (2003). *Type*: Hamersley Ra. National Park, at Coppin Pool, 300 m upstream from crossing, Western Australia, 12 May 1980, *M. Trudgen* 2518 (*holo*: PERTH 00698423; *iso*: CANB, G, K, NY).

### **Acacia drepanocarpa**

As currently defined *Acacia drepanocarpa* F.Muell. comprises two subspecies, subsp. *drepanocarpa* and subsp. *latifolia* Pedley, which are distinguished only by their phyllodes according to Pedley (1974: 10). However, preliminary observations of material at the Western Australian Herbarium (PERTH) suggests that the taxonomic status of this species in Western Australia needs to be reassessed.

In Western Australia, plants attributed to subsp. *drepanocarpa* occur at the western extremity of the Great Sandy Desert (adjacent to the 80 Mile Beach) where they extend from the Edgar Ranges (about 150 km due SE of Broome) south-west to near Cape Keraudren (about 100 km due NE of Port Hedland). There is a major geographic separation of over 1,000 km between these populations and the more easterly occurrences of subsp. *drepanocarpa* in Northern Territory and Queensland. The Western Australian plants are characterized by linear phyllodes measuring mostly 6–8 cm long, 1–2(–3) mm wide and with  $l:w = 20\text{--}80$  and as such fall within the range of variation for the subspecies as reported by Pedley (1978: 150–151) and NSW (2001: 257–258). They differ, however, from the Northern Territory and Queensland plants of subsp. *drepanocarpa* in having more prominently raised phyllode nerves (at least when dry) and the gland being closer to the base, i.e. mostly 0–2 mm above the pulvinus (the gland on the Northern Territory and Queensland plants appears to be (2–)4–10 (–20) mm above the pulvinus but this needs to be checked against a wider range of material than has been examined by us). In these two respects the Western Australian plants accord better with subsp. *latifolia* than with subsp. *drepanocarpa*.

In Western Australia, plants referable to *A. drepanocarpa* subsp. *latifolia* extend from the Kimberley region south to the western extremity of the Great Sandy Desert from where they just reach the Pilbara region near the Gregory Range (about 300 km south-east of Port Hedland). This distribution is contiguous with the geographic range of subsp. *latifolia* in Northern Territory and Queensland. The Western Australian plants have phyllodes 4–8 cm long, (4–)5–12 mm wide, l:w = 5–15, the nerves are prominently raised and the gland is located 0–2 mm above the pulvinus.

Most of the plants in Western Australia attributed to *A. drepanocarpa* can be assigned to one or other subspecies based on their phyllodes (narrow in subsp. *drepanocarpa* and broad in subsp. *latifolia*). Furthermore, the distributions of the two subspecies appear not to overlap despite the fact that both occur in the Great Sandy Desert (subsp. *drepanocarpa* occurs further to the west than does subsp. *latifolia*).

However, in Western Australia there are some collections that, based on phyllode dimensions at least, appear to be intermediate between the two subspecies, their phyllodes measuring mostly 5–7 cm long, 3–5 mm wide, with l:w = 7–17. Geographically these plants are also intermediate between the two subspecies, being recorded from around Shay Gap in the Pilbara region (about 150 km north-west of Gregory Range), westwards to Cape Keraudren and northwards well into the geographic range of subsp. *drepanocarpa* (it is not known with certainty if the two entities are sympatric, but judging from herbarium label data they may well be). This seemingly intermediate entity has been given the phrase name *Acacia* sp. Nalgi (N.T. Burbidge 1317) at PERTH.

Further study is needed to determine the taxonomic status of these seemingly intermediate plants. The area in which they occur is rather remote and is poorly collected. It is possible that they represent a narrow phyllode form of subsp. *latifolia* or perhaps a hybrid between this subspecies and subsp. *drepanocarpa*. However, another and perhaps more likely possibility is that all the Western Australian plants currently ascribed to *A. drepanocarpa* may represent a single (variable) taxon which includes subsp. *latifolia*, ‘subsp. *drepanocarpa*’ (representing a particularly narrow phyllode form of the species) and the intermediate plants. If this is the case then this Western Australian entity (which extends into Northern Territory and Queensland as subsp. *latifolia*) probably warrants description as a species distinct from *A. drepanocarpa* (which then would not occur in Western Australia).

#### ***Acacia fecunda* Maslin, sp. nov.**

*Frutices* 1.5–3 m alti. *Ramuli* minute et dense albo-pilosi. *Phyllodia* anguste elliptica vel oblanceolata, recta et dimidiata vel leviter aut modice falcato recurvata, ad basim angustata, acuta, 8–12 cm longa, 10–15 mm lata, subtiliter multi-striata nervis 2 prominentibus; *pulvinus* 4–5 mm longus. *Inflorescentium* simplex; *pedunculi* 7–12 mm longi; *spicae* 20–40(–45) mm longae. *Flores* 5-meri; *calyx* gamosepalus, in lobis oblongo-triangularibus breviter divisus. *Legumen* abundantia, 7–9 cm longa, linearia, firme chartacea vel tenuissime crustacea. *Semina* in legumina longitudinalia, oblonga vel oblongo-elliptica, 3.5–4 mm longa, arillata.

*Typus*: east of Nullagine, Western Australia [precise locality withheld for conservation reasons], 11 October 2004, B.R. Maslin 8679 (*holo*: PERTH 06927653; *iso*: K, MEL, NY, PERTH 06927645).

*Acacia* sp. Nullagine (B.R. Maslin 8510), in Council of Heads of Australasian Herbaria, *Australian Plant Census*, <http://www.anbg.gov.au/chah/apc/index.html> [accessed 19 February 2008].



Obconic *shrubs* 1.5–3 m tall, with 2–4 main stems (4–5 cm in diameter at base) arising from near ground level, crown open to sub-dense and spreading to about 3 m across. *Bark* thin, smooth (although with a few longitudinal fractures developed near base of stems on mature plants), grey on main stems, upper branches (and stems of young plants) orange. *Branchlets* slender, terete except angled at extremities, very finely ribbed, minutely and densely white-hairy (hairs straight or slightly crisped, mostly appressed except sometimes some sub-appressed or patent). *New shoots* light brown when first initiated due to a microscopic indumentum of irregularly-shaped scales intermixed with silvery non-resin hairs, ageing light green. *Stipules* caducous. *Phyllodes* narrowly elliptic to oblanceolate, straight and dimidiate to shallowly or moderately falcately recurved, narrowed at base, obtuse or acute with a sometimes up-turned apical callosity, 8–12 cm long, 10–15 mm wide, wide-spreading to ascending, coriaceous to thinly coriaceous, glabrous or sparsely and minutely appressed-hairy, often slightly resinous (but not sticky), dull or with a very slight sheen, green or bluish green (and sometimes lightly pruinose when young); finely multistriate with 2 sub-central *nerves* more evident than the rest, minor nerves closely parallel but sometimes very few longitudinally anastomosing, the 2 main nerves confluent with one another near pulvinus or  $\pm$  free but not confluent with lower margin although situated close to it; *marginal nerve* narrow, discrete, yellowish to light brown; *pulvinus* 4–5 mm long, distinct, orange when fresh (drying dull yellow to brownish), minutely hairy at least on upper surface, normally finely transversely wrinkled and sometimes shallowly longitudinally grooved or ridged (at least when dry). *Inflorescences* simple, 2 per axil, new shoots arising from within angle formed by peduncles; *peduncles* 7–12 mm long, sub-stout, glabrous, scurfy or minutely hairy as on branchlets; *receptacle* glabrous; *basal peduncular bract* triangular, *c.* 1 mm long, caducous; *spikes* 20–40(–45) mm long, 5–6 mm wide, light golden, densely flowered. *Bracteoles* linear-spathulate, *c.* 1 mm long. *Flowers* 5-merous; *calyx* gamosepalous, 1/2 to 3/5 length of corolla, very shortly divided into oblong-triangular lobes, calyx tube minutely white-hairy and not obviously nerved; *petals* 1.5 mm long, sub-glabrous to appressed-hairy, very obscurely 1-nerved to nerveless; *ovary* densely minutely villous. *Pods* prolific, linear, very slightly constricted between seeds and  $\pm$  shallowly but distinctly rounded over them, 7–9 cm long, 3–4 mm wide, firmly chartaceous to very thinly crustaceous, straight or almost so, sub-glabrous to minutely appressed-hairy (observe indumentum under magnification), brown (darkest over seeds), the marginal nerve narrow and scarcely thickened. *Seeds* longitudinal in pods, obloid to obloid-ellipsoid, 3.5–4 mm long, *c.* 2 mm wide, compressed (1 mm thick), dark brown with a satin lustre; *pleurogram* indistinct, open towards the hilum; *areole* elongate (*c.* 2 mm long, 0.5 mm wide); *funicle* filiform, abruptly expanded into a small terminal, white *aril*. (Figure 3)

*Characteristic features.* Obconic *shrubs* with spreading,  $\pm$  open crowns. *Branchlets* slender, minutely and densely white-hairy. *Phyllodes* narrowly elliptic to oblanceolate, straight and dimidiate to falcately recurved, narrowed at base, 8–12 cm long, 10–15 mm wide, wide-spreading to ascending, green or bluish green, finely multistriate with 2 sub-central nerves more evident than the rest, the minor nerves closely parallel; *pulvinus* 4–5 mm long, distinct, orange when fresh. *Spikes* 2 per axil, light golden, densely flowered, 20–40(–45) mm long; *peduncles* 7–12 mm long, sub-stout. *Pods* produced in great profusion, 7–9 cm long, 3–4 mm wide, linear, very slightly constricted between seeds and  $\pm$  shallowly but distinctly rounded over them, thin-textured, sub-glabrous to minutely appressed-hairy. *Seeds* longitudinal in pods, dark brown with a satin lustre; *aril* white.

*Selected specimens examined.* WESTERN AUSTRALIA [precise localities withheld for conservation reasons]: East of Nullagine: 14 Apr. 1967, *J.S. Beard* 4605 (PERTH); 30 May 2004, *B.R. Maslin* 8510 (AD, CANB, DNA, K, MEL, NSW, NY, PERTH); 30 May 2004, *B.R. Maslin* 8512 (G, PERTH); 16 Aug. 2006, *B.R. Maslin* 8884 (PERTH); 27 Aug. 2004, *S. van Leeuwen* 5224 (NSW, PERTH).

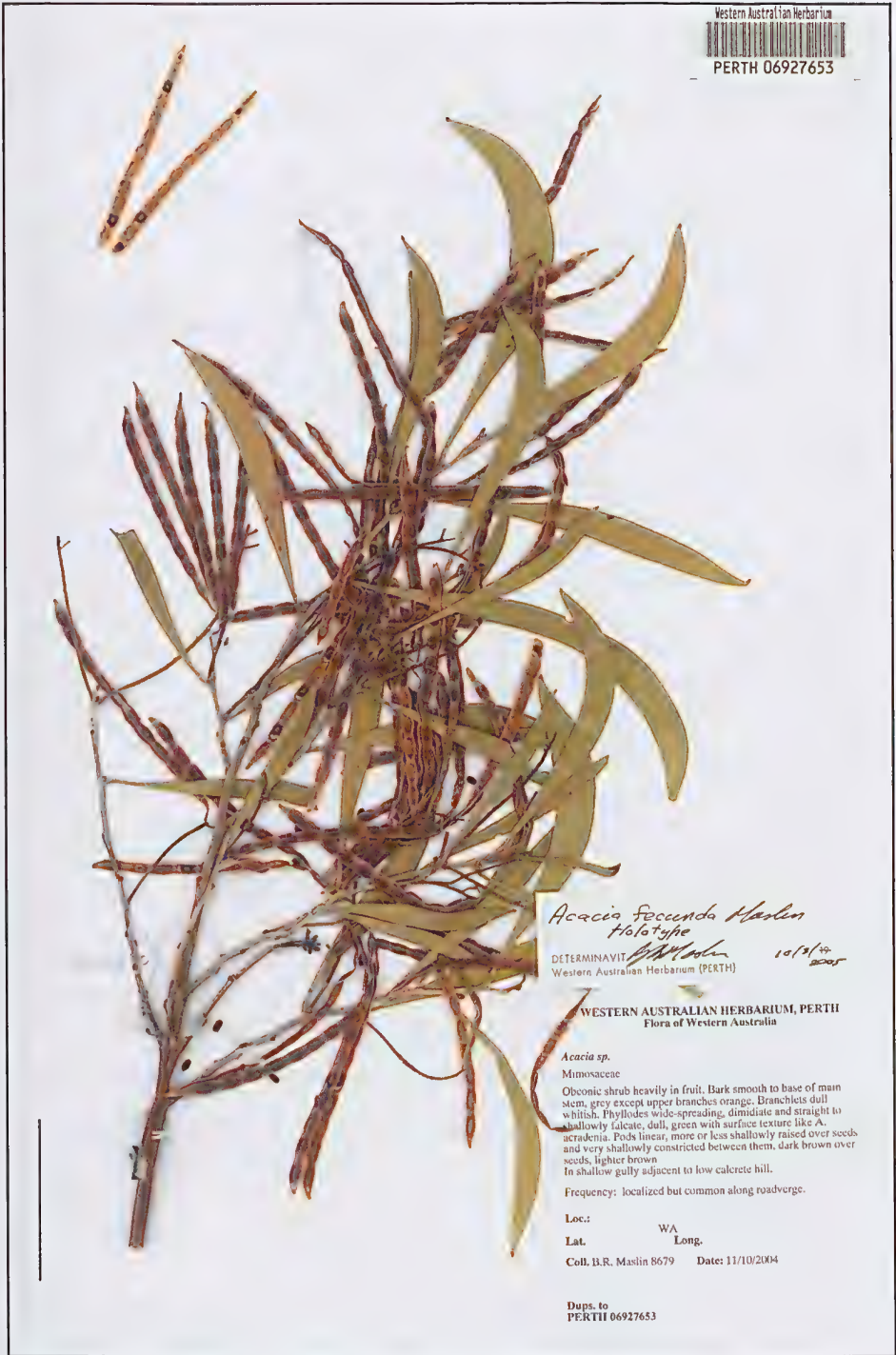


Figure 3. Holotype of *Acacia fecunda* Maslin (PERTH 06927653), scale = 5 cm.

*Distribution and ecology.* Confined to the Pilbara region where it is known only from a few disjunct populations east of Nullagine (to near the Oakover River) where it grows in areas underlain by Mosquito Creek sedimentary rocks. It is likely that further survey of similar habitats will reveal additional populations (but these areas are remote and difficult of access) although it is not expected that this species will be shown to have a particularly extensive geographic range. *Acacia fecunda* is often common in the places where it occurs and it favours water-gaining sites.

*Flowering and fruiting period.* Flowering specimens have been collected between mid-April and late May and it is probable that some flowers would remain on the plants until about mid-June. Only a single fruiting collection has been made (the Type) and this was collected around mid-October. It is estimated that mature seed would occur from around late September to about early November.

*Conservation status.* DEC Conservation Codes for Western Australian Flora: Priority Three (Atkins 2008). It is noted, however, that this species is currently not known from the Western Australian conservation estate.

*Etymology.* The species name is derived from the Latin *fecundus* (fruitful, fertile, prolific) in allusion to the large number of pods produced.

*Affinities.* *Acacia fecunda* belongs to sect. *Juliflorae* and appears most closely related to *A. gonoclada* F.Muell. These two species have similar phyllodes (especially size and nervature), simple inflorescences, pedunculate spikes, 5-merous flowers, very shortly lobed calyces and linear, thin-textured pods and longitudinally-oriented seeds with white arils. *Acacia gonoclada* is most readily distinguished from *A. fecunda* by its stouter, acutely angled branchlets, shorter peduncles (mostly 3–6 mm long), shorter pods (20–45 mm long) and generally shorter spikes (10–25 mm long), and often shallowly incurved (never recurved) phyllodes. *Acacia gonoclada* does not grow in the Pilbara region but occurs further north in the Kimberley region from where it extends eastwards through Northern Territory to Queensland. The new species may superficially resemble two Pilbara species, *A. elachantha* M.W.McDonald & Maslin and *A. hamersleyensis* Maslin. *Acacia elachantha* is readily recognised by its phyllodes having 3 prominent longitudinal nerves with widely spaced, longitudinally anastomosing minor nerves, seeds with yellow arils and densely hairy new shoots (hairs silver or yellow). *Acacia hamersleyensis* is most readily recognized by its glaucous to sub-glaucous phyllodes, often larger spikes (36–60 × 6–8 mm) and most particularly by its broader (5–8 mm wide), hairy pods with obliquely placed seeds. *Acacia fecunda* may be superficially similar to *A. tumida* Benth. var. *pilbarensis* M.W.McDonald in having spicate inflorescences and quite large phyllodes (the two taxa grow in the same general area) but in var. *pilbarensis* the branchlets are glabrous and usually pruinose, the spikes are arranged in racemes and the pods are broader (6–7 mm wide) and woody.

*Notes.* *Acacia fecunda* regenerates from seed following fire or other disturbance (may form dense roadside populations). Plants flower from an early age (when only about 0.5 m tall and probably no older than about one year).

***Acacia leeuweniana* Maslin, *sp. nov.***

*Abores* obconicae bene formatae 4–8(–14) m altae, nec ramuli neque phyllodia pendulosa. *Cortex* ‘Minni Ritchi’ (i.e. brunneo-oligo-ruber et in angusto retrorse laciniis crispatis in quoquo extremo exfoliatus), plantis veteres basim caulium vagina grisea brevi ornati. *Ramuli* fragili. *Phyllodia* plerumque linearia, 7–12(–15) cm longa, 1–2(–2.5) mm wide, non praesertim rigida, recta vel fere recta, plana (sed plantae



juvenales et saepe adulescentes teretes), viridia vel obscure griseo-viridia vel sub-glaucua, subtiliter longitudinaliter multi-striata, apicibus pungentibus vel sub-pungentibus. *Spicae* pallido aureae, floribus non praecipue dense ordinatis. *Calyx* longitudinale *c.* 1/2 corollae partes aequans, in lobis late triangularibus breviter dissectus. *Legumina* late-lineararia, 3–10 cm longa, 6–8 mm lata, plana, plerumque leviter curvata, coriaceo-crustacea vel  $\pm$  sub-lignosa. *Semina* grandia (7–11 mm longa, 3.5–5 mm lata), plana, arillo parvo. Ad collibum graniticum limitatis.

*Typus*: south-west of Marble Bar, Western Australia [precise locality withheld for conservation reasons], 20 May 1982, B.R. Maslin 5266 (*holo*: PERTH 00164240; *iso*: K, MEL, NSW, NY, PERTH).

Shapely, obconic, erect *trees* 4–8(–14) m tall, with a single trunk or very few trunks from ground level, neither branchlets nor phyllodes pendulous. *Juvenile plants* (to *c.* 1 m tall) divaricately branched and possessing short (sometimes only 30–40 mm long), rigid, terete, pungent phyllodes, some of which may occur in clusters on brachyblastic short-shoots (as occurs in some forms of Mulga). *Adolescent plants* often with a conifer-like appearance, the lower branches  $\pm$  horizontally spreading with those higher up ascending, the normally terete phyllodes typically mealy white due to surface wax. *Bark* ‘Minni Ritchi’ (i.e. brownish red and exfoliating in narrow shavings that curl retrorsely from each end), ageing grey (a short grey stocking occurs around base of stems of oldest plants). *New shoots* glabrous, glaucous due to white surface wax. *Branchlets* brittle (snapping easily with a clean break), sometimes with ‘Minni Ritchi’ bark evident, terete, ribs very obscure, glabrous, light brown or dark red-brown towards extremities. *Phyllodes* (mature plants) normally linear, 7–12(–15) cm long, 1–2(–2.5) mm wide, not especially rigid, straight or almost so, flat, glabrous or sometimes very sparsely and minutely appressed-hairy, green to dull grey-green or sub-glaucous; very finely multistriate with *nerves* parallel and close together; *apices* narrowed to a pungent or sub-pungent point; *pulvinus* finely transversely wrinkled and yellow or brown (when dry). *Gland* not prominent, situated on upper margin of phyllode 0–1 mm above the pulvinus. *Inflorescences* simple, 2–6 per axil; *peduncles* 5–10 mm long, glabrous or (especially at base) sometimes minutely and silvery sericeous, resinous (but not sticky); *spikes* 10–20 mm long (when dry), light golden, the flowers not especially densely arranged along the glabrous receptacle. *Bracteoles* very small and insignificant, *c.* 0.5 mm long. *Flowers* 5-merous, buds quite large; *calyx* about 1/2 (or slightly more) length of corolla, gamosepalous, divided for about 1/4 or less its length into broadly triangular, sparsely ciliolate lobes; *calyx tube* nerveless, glabrous or almost so,  $\pm$  broad-based (*c.* 1 mm wide); *petals* 1.5–2 mm long, glabrous, very obscurely 1-nerved. *Pods* broad-linear, 3–10 cm long, 6–8 mm wide, flat, without internal partitions, coriaceous-crustaceous to  $\pm$  sub-woody, shallowly (occasionally a few strongly) curved, glabrous, resinous (but not sticky), very obscurely and sparingly longitudinally nerved, greyish light brown (exterior), dark red-brown (interior), the marginal nerve often visible but not prominent. *Seeds* longitudinal in pods, obloid or sometimes obloid-ellipsoid, large (7–11 mm long, 3.5–5 mm wide), flattened (1.5–2 mm thick), slightly shiny, brown (commonly tinged greyish); *pleurogram* ‘u’-shaped to ‘v’-shaped with a wide opening towards the hilum, often bordered by a diffuse band of dull yellow tissue; *areole* small, *c.* 1 mm long, 0.8–1 mm wide; *funicle* expanded into a very small terminal *aril*. (Figure 4)

*Characteristic features.* Shapely, obconic *trees* with neither branchlets nor phyllodes pendulous, adolescent plants often with a conifer-like appearance. *Bark* ‘Minni Ritchi’ (i.e. brownish red and exfoliating in narrow shavings that curl retrorsely from each end), a short grey stocking occurs around base of stems of oldest plants. *Branchlets* brittle (snapping easily with a clean break). *Phyllodes* (mature plants) linear and long (7–12(–15) cm long), flat (terete on juvenile plants), straight or almost so, green to dull grey-green or sub-glaucous, not especially rigid, very finely multistriate, pungent or sub-pungent. *Spikes* light golden, the flowers not especially densely arranged. *Calyx* about 1/2 (or slightly more) length of corolla, shortly dissected into broadly triangular lobes. *Pods* broad-linear,



Figure 4. Holotype of *Acacia leeuweniana* Maslin (PERTH 00164240), scale = 5 cm.



6–8 mm wide, mostly shallowly curved, coriaceous-crustaceous to  $\pm$  sub-woody, flat. *Seeds* large (7–11 mm long, 3.5–5 mm wide), flattened; *aril* small. Confined to granite outcrops.

*Selected specimens examined.* WESTERN AUSTRALIA [precise localities withheld for conservation reasons]: SW of Marble Bar: 19 Apr. 1967, *J.S. Beard* 4627 (PERTH); 27 June 1981, *B.R. Maslin* 4951A–F (all PERTH); 18 July 2000, *B.R. Maslin* 8103 (PERTH); 29 May 2004, *B.R. Maslin* 8490 (AD, CANB, DNA, PERTH); 18 Oct. 1983, *P. Ryan s.n.* (PERTH 00165212, 00165204 & 00165239); 26 Oct. 1988, *L. Thomson* LXT 1160 (PERTH). S of Port Hedland: 29 May 2004, *B.R. Maslin* 8492 (CANB, MEL, NSW, PERTH); 9 Sep. 2004, *S. van Leeuwen* 5247 (K, MEL, NSW, PERTH).

*Distribution and habitat.* Known from only two granite rocks in the Pilbara region, Western Australia. It is common in the places where it occurs.

*Flowering and fruiting period.* Flowers have been recorded in April/May (during which time some plants may also be sterile) and also late October. It is quite possible that this species flowers in response to the timing and intensity of rainfall events. Pods with mature seeds have been collected from mid- to late October.

*Conservation status.* DEC Conservation Codes for Western Australian Flora: Priority One (Atkins 2008).

*Etymology.* This handsome new species is named in honour of Dr Stephen van Leeuwen, Research Scientist with the Department of Environment and Conservation (and second author of the present paper), in recognition of the major contribution that he has made to our understanding of the Pilbara flora. Stephen has worked in the Pilbara for 25 years and apart from his extensive documentation and collections of plants of the region during this period he has facilitated the work of many other people through his guidance (technical, scientific and in the field) and advice. Stephen is in charge of the botanical component of the comprehensive ‘Pilbara Biological Survey’ that is currently in progress.

*Common name.* Leeuwen’s Wattle (suggested new common name).

*Affinities.* *Acacia leeuweniana* belongs to *Acacia* sect. *Juliflorae* and is most closely related to *A. cyperophylla* F. Muell. which comprises two varieties, only one of which occurs in the Pilbara region. The typical variety is widespread, ranging from the Ashburton district south of the Pilbara eastwards through Western Australia to South Australia, Northern Territory and Queensland; var. *omearana* Maslin is known from only two Pilbara populations, one near Nullagine and the other north-west of Marble Bar. *Acacia cyperophylla* is most readily distinguished from *A. leeuweniana* by its normally terete mature phyllodes and by the fact that it grows along watercourses (not granite hills as does the new species); var. *omearana* is further recognised by its distinctively pendulous branchlets and phyllodes. *Acacia cyperophylla* var. *cyperophylla* commonly has slightly narrower pods than those of *A. leeuweniana* (mostly 4–6 mm wide in W.A. plants, although reaching 9 mm in eastern Australia), its flowers tend to be more widely spaced within the spike (best observed in mature buds just prior to anthesis) and the plants appear to develop a longer stocking of grey bark at the base of stems below the characteristic reddish Minni Ritchi bark.

*Notes.* This species was first collected in 1967 by J.S. Beard from south-west of Marble Bar and was originally considered to be a variant of *A. rhodophloia* Maslin (*vide* Maslin 1980: 318). However, in the light of further study and collections it is now clear that its affinities lie more closely with *A. cyperophylla* (*vide* NSW 2001a: 291).



**Acacia minutissima** Maslin, *sp. nov.*

*Fructices* intricate ramosi 0.3–1(–1.5) m alti. *Ramuli* glabri, lenticellati, resinosi. *Stipulae* persistentae, erectae, 0.5–1 mm longae. *Phyllodia* asymmetricaliter elliptica vel obtriangularia, margine supero profunde convexo vel ad glandem angulato, 3–6(–7) mm longa, 2–3 mm lata, glabra, costa centrali vel leviter excentrica, plerumque gradatim angustata in apicem brevi-acuminati et sursum in acumen distinctum rigidum subulatum terminans. *Inflorescentia* simplices; *pedunculi* glabri, 6–8 mm longi; *capitula* globularia. *Flores* 5-meri; *sepala* libera, lineari-spathulata. *Legumen* 10–40 mm longa 3–4 mm lata, linearia vel anguste oblonga, firme chartacea, glabra. *Semina* non vidi.

*Typus*: 41.5 km east of Balfour Downs homestead turn-off on Tallawana Track to Canning Stock Route, Western Australia, 15 August 2006, B.R. Maslin 8882 (*holo*: PERTH 07416229; *iso*: AD, BRI, CANB, DNA, K, MEL, NY).

*Acacia maitlandii* variant, Maslin (1981: 129, 2001: 388).

*Acacia* sp. Talawana (B.R. Maslin 8540), in Council of Heads of Australasian Herbaria, *Australian Plant Census*, <http://www.anbg.gov.au/chah/apc/index.html> [accessed 19 February 2008].

Diffuse, intricately and openly branched, low-spreading (sometimes semi-prostrate) *shrubs* 0.3–(–1.5) m tall and at least 1–3 m across, stem dividing just above ground level into  $\pm$  horizontally spreading branches which sometimes produces a pseudo-bonsai growth form, oldest plants having a somewhat craggy appearance due to persistent, short lateral branches which are denuded of phyllodes. *Bark* light grey, slightly roughened. *Branchlets* terete, finely ribbed (rib most evident for a short distance below insertion of phyllodes), lenticellate (lenticels scattered, circular, dull yellow), glabrous, resinous, slightly viscid when fresh but not sticky when dry, light brown or reddish brown at extremities but soon ageing grey. *Stipules* persistent, erect and appressed to branchlets, enveloped and often obscured by resin on young branchlets, triangular, 0.5–1 mm long, 0.4–0.5 mm wide at base, slightly thickened. *Phyllodes* asymmetrically elliptic to obtriangular, broadest at or above the middle, lower margin  $\pm$  shallowly convex or sometimes almost straight, the upper margin longer than lower and markedly convex or angled at the gland, 3–6(–7) mm long, 2–3 mm wide, l:w = 1–1.6, glabrous, smooth, green; *midrib*  $\pm$  evident (at least when dry), central or slightly excentric, sometimes with a less pronounced second nerve on upper side of midrib extending from the pulvinus towards the gland; *apices* abruptly or more commonly gradually narrowed to a short-acuminate apex and terminating in a distinct, rigid, subulate, pungent, straight, brown point 0.5–1 mm long. *Gland* situated on upper margin of phyllode 2–4 mm above the base (at, or above, the centre of the phyllode). *Inflorescences* simple, 1 per axil; *peduncles* glabrous, 6–8 mm long, red (at least when fresh), base ebracteate; *heads* globular, densely 40–50-flowered, 5 mm in diameter when fresh, golden; *flower buds* dull red. *Bracteoles* spatulate and sparsely hairy, *c.* 1 mm, claws linear, the laminae inflexed, widely ovate, *c.* 0.3 mm wide and slightly thickened. *Flowers* 5-merous; *sepals* 2/3 to 3/4 length of corolla, free, linear-spathulate, sparsely hairy (morphology same as bracteoles); *petals* *c.* 1.5 mm long, glabrous, nerveless. *Pods* (old fruiting valves), linear to narrowly oblong, flat but shallowly rounded over seeds, not or very shallowly constricted between seeds, 10–40 mm long, 3–4 mm wide, firmly chartaceous, sub-straight to slightly curved, glabrous, dark brown (pods maroon-coloured when first initiated), marginal nerve yellow to light brown. *Seeds* not seen but *funicles* very short (*c.* 1 mm long), filiform and persisting on inside of pods. (Figure 5)



Figure 5. Holotype of *Acacia minutissima* Maslin (PERTH 07416229), scale = 5 cm.



*Characteristic features.* Intricately and openly branched, low-spreading glabrous shrubs. Bark light grey, slightly roughened. Branchlets lenticellate, resinous (slightly viscous when fresh but not sticky when dry), light brown or reddish brown at extremities. Stipules persistent, very small, erect, enveloped and often obscured by resin on young branchlets. Phyllodes asymmetrically elliptic to obtriangular, broadest at or above the middle, lower margin  $\pm$  shallowly convex or sometimes almost straight, the upper margin longer than lower and markedly convex or angled at the gland, small, 3–6(–7) mm long, 2–3 mm wide, l:w = 1–1.6, midrib central or slightly excentric; apices normally short-acuminate and ending in a distinct, rigid, pungent, brown point. Inflorescences simple, 1 per axil; peduncles short (6–8 mm long), red when fresh, base ebracteate; heads globular, 40–50-flowered. Pods (old fruiting valves) 10–40 mm long, 3–4 mm wide, linear to narrowly oblong, not or very shallowly constricted between seeds, flat but shallowly rounded over seeds, firmly chartaceous. Funicle not expanded into an aril.

*Other specimens examined.* WESTERNAUSTRALIA: between Windy Corner and Well 24, Little Sandy Desert, 39 miles (62.4 km) from Windy Corner, Canning Stock Route, 1 Aug. 1967, J.S. Beard 4923 (PERTH); 32 km ESE of Canning Stock Route Well 24, Little Sandy Desert, 19 July 2001, P.K. Latz 17851 (NT n.v., PERTH); Balfour Downs Station, c. 40 km E along Talawana Track, 1 June 2004, B.R. Maslin 8540 (K, PERTH); Balfour Downs Station, 49 km E along Talawana Track, 1 June 2004, B.R. Maslin 8542 (PERTH); 41.5 km E of Balfour Downs homestead turn-off on Tallawana Track to Canning Stock Route, Western Australia, 15 Aug. 2006, B.R. Maslin 8882A (PERTH); Little Sandy Desert, 2 May 1979, A.S. Mitchell 1017 (NT n.v., PERTH); Kearthland District, 65 km E of Calvert Range, 25 June 1984, G.J. Morse 208 (PERTH); about 40 km SE of Jigalong Community on track to Boonawarra, 26 June 1996, A.L. Payne PRP 1368 (PERTH); about 120 km E of Balfour Downs Homestead on Talawana Track to Rudall River, 1 Apr. 1995, H. Pringle PRP 96B (PERTH).

*Distribution and ecology.* Occurs in the eastern extremity of the Pilbara (east of Balfour Downs Station) extending east into the Little Sandy Desert to the general vicinity of Lake Disappointment in a series of discontinuous populations. This new species was noted under *A. maitlandii* F.Muell. in Maslin (1981: 129 and 2001: 388) where it was erroneously referred to as being recorded from the Gibson Desert. In the Pilbara *A. minutissima* is found in a few localized populations and is not uncommon in the places where it occurs. It most commonly grows on sand or loam (sometimes with a gravelly mantle) on plains or in swales between sand dunes, in shrub steppe with *Triodia* ('Spinifex') hummock grassland understorey (the Spinifex often overtops plants of *A. minutissima*). The Little Sandy Desert collection by Mitchell was gathered from a chenopod flat which, judging from the extant collections, seems to be an atypical habitat for this species.

*Flowering and fruiting period.* Because of the paucity of specimens it is difficult to determine the phenology of this species. Flowering commences in mid July or early August and probably extends to about September. Although mature pods and seeds have not been seen they would be expected to occur in November and perhaps early December.

*Conservation status.* Not considered rare or endangered. However, it is noted that the species is currently not known from the Western Australian conservation estate.

*Etymology.* The botanical name is derived from the Latin *minutus* (little, small) and the adjectival superlative *-issimus* (very), in reference to the extremely small phyllodes which characterize this species.

*Affinities.* *Acacia minutissima* is a member of *Acacia* sect. *Acacia* and together with *A. subtiliformis* Maslin (see below) is related to *A. maitlandii* which is most readily distinguished from both by its much longer phyllodes (i.e. 7–25 mm). *Acacia subtiliformis* and *A. minutissima* are superficially very similar, especially in that they are both glabrous shrubs with globular, densely-flowered heads and very small, asymmetric, pungent-pointed phyllodes; they also share other significant characters such as lenticellate branchlets, small stipules which are embedded in a resin (at least on the young branchlets), simple inflorescences with ebracteate peduncles and free sepals. *Acacia subtiliformis* is most readily distinguished from *A. minutissima* in its growth form (tall, spindly, wispy, single-stemmed shrubs), branching pattern (the ultimate branchlets are longer, less rigid and not as divaricately divided) and its phyllodes which are slightly smaller (mostly 2–3.5 mm long and less than 2 mm wide) and differently shaped (most obvious is that the phyllodes of *A. subtiliformis* are never obtriangular, their upper margin is less prominently convex and is never angled at the gland, and the apex is less acuminate with a slightly shorter terminal cusp). Mature pods and seeds of *A. minutissima* have not been seen but judging from old fruiting valves it is unlikely that they will be very different from those of *A. subtiliformis*. The two species are not known to grow together.

*Notes.* *Acacia minutissima* was first collected by J.S. Beard in 1967 from the Canning Stock Route in the Little Sandy Desert. This species is probably killed by fire and regenerates from seed.

#### ***Acacia roborum* Maslin, sp. nov.**

*Frutices* glabri 2–3 m alti, ramis superioribus pallido aeneis. *Ramuli* luteoli vel pallido croceo-brunnei, nec pruinosi. *Stipula* spinosa, in plantis juvenalis praesentia sed aetate absentia. *Phyllodia* linearia vel anguste oblonga vel linearia-oblongata, 15–25(–35) mm longa (1–)2–3(–4) mm lata, l:w = (5–)6–10(–14), laete viridia, aliquantum carnosa, longitudinaliter rugata, costa et venis lateralibus plerumque non manifestis in statu sicco. *Inflorescentiae* simplices, in surculos novos initiatae pedunculo solitario intra axillum phyllodiorum formanti, phyllodiis subtentibus maturentibus ante anthesin; *capitula* aurea, 40–60-florifera. *Legumina* oblonga vel anguste oblonga, (15–)25–40(–60) mm longa, 6–8(–9) mm lata, papyracea, plana sed supra semina secus in linea media rotundata, inter-semine vix constricta. *Semina* in legumino transverse posita, nigra, ± non variegata; *arillus* parvus.

*Typus:* Balfour Downs Station (north-east of Newman) just east of Christies Crossing, Western Australia, 13 August 2006, B.R. Maslin 8858 (*holo:* PERTH 07415893; *iso:* CANB, K, MEL).

*Acacia* sp. aff. *victoriae*, Maslin in J. Jessup, *Fl. Central Australia* p. 131 (1981).

*Acacia synchronicia* variant, Maslin (1992: 304, 2001: 379).

*Acacia* sp. Rudall River (B.R. Maslin 2046A), in Council of Heads of Australasian Herbaria, *Australian Plant Census*, <http://www.anbg.gov.au/chah/apc/index.html> [accessed 19 February 2008].

Diffuse, spreading, openly branched, multi-stemmed, glabrous *shrubs* 2–3 m tall, main stems slightly crooked, crowns not dense. *Bark* grey on main stems, light bronze on upper branches, smooth. *Branchlets* terete, very obscurely ribbed, yellowish to pale orange-brown or bronze, not pruinose. *Stipules* spiny, present on young plants but normally absent or very few on mature plants, 1.5–3(–4) mm long. *Phyllodes* linear to narrowly oblong or linear-oblongate, 15–25(–35) mm long, (1–)2–3(–4) mm wide, l:w = (5–)6–10(–14), rather thick, fleshy and breaking with a clean snap upon bending (when fresh), longitudinally wrinkled when dry, straight to shallowly incurved, characteristically bright



green; *midrib* obscure or more commonly not evident, lateral veins not evident; *apices* rounded and excentrically mucronulate. *Gland* not overly prominent, situated on upper margin of phyllode 0–0.5 mm above the pulvinus, circular to elliptic, 0.4–0.5 mm long, 0.4–0.5 mm wide. *Inflorescences* simple, initiated on new shoots with a single peduncle within axil of developing phyllodes, subtending phyllodes fully developed before heads reach anthesis; *peduncles* (8–)10–17 mm long; *heads* light golden, 40–60-flowered. *Bracteoles* similar to sepals. *Flowers* 5-merous; *sepals* free, 2/3 length of petals, linear-spathulate; *petals* nerveless. *Pods* oblong to narrowly oblong, flat but rounded over the seeds along the midline, mostly straight-edged, (15–)25–40(–60) mm long, 6–8(–9) mm wide, papery, straight or slightly curved. *Seeds* transverse in the pods, obloid to ellipsoid, ovoid or globose, 3–4 mm long, 2.2–3.2 mm wide, somewhat compressed, dull or slightly shiny, uniformly black or sometimes very obscurely mottled dark brown; *areole* ‘u’-shaped and very small at centre of seed; *funicle* short, thick, cream coloured, very slightly expanded into a small terminal *aril*. (Figure 6)

*Characteristic features.* Openly branched, glabrous *shrubs* 2–3 m tall, upper branches light bronze coloured. *Branchlets* yellowish to pale orange-brown or bronze, not pruinose. *Stipules* spiny, present on young plants but usually absent from mature plants. *Phyllodes* short and narrow (15–25(–35) × (1–)2–3(–4) mm, l:w mostly 6–10), linear to linear-oblongate or narrowly oblong, bright green, not pruinose, rather fleshy (fresh phyllodes breaking with a clean snap when bent), longitudinally wrinkled and *midrib* normally not evident when dry. *Gland* not overly prominent, 0.4–0.5 mm long. *Inflorescences* simple, initiated on new shoots with a single peduncle within axil of developing phyllodes, subtending phyllodes fully developed before heads reach anthesis; *heads* golden, 40–60-flowered. *Pods* papery, oblong to narrowly oblong, flat but rounded over seeds along midline, not or scarcely constricted between seeds. *Seeds* transverse in the pods, black, sometimes very obscurely mottled dark brown; *aril* small.

*Selected specimens examined.* WESTERNAUSTRALIA: The Gap, 1.4 km N of the turn-off to Christmas Pool, Paterson Range, 4 Sep. 1986, R.J. Chinnock 6963 (PERTH ex AD); 4.5 km S of Pargurr, Little Sandy Desert, 18 July 2001, P.K. Latz 17826 (NT n.v., PERTH); upper Rudall River area, 2 Sep. 1971, B.R. Maslin 2046a (BRI, NT, PERTH – distributed as *A. aff. victoriae*); Ripon Hills Road (E of Marble Bar), 33.8 km E of Nullagine River, 27 May 2004, B.R. Maslin 8466 (PERTH); near abandoned Shay Gap mining settlement, 8 Oct. 2004, B.R. Maslin 8649 (MEL, PERTH); Barrow Island, 27 July 2006, B.R. Maslin 8804 (PERTH); Balfour Downs Station (NE of Newman), 13 Aug. 2006, B.R. Maslin 8865 (growing with typical variant of *A. synchronicia*) (PERTH); 16.5 km E of Warrawagine Hsd on alluvial plain of Oakover River, 28 Oct. 1995, A.A. Mitchell PRP924 (growing with typical variant of *A. synchronicia*) (PERTH); 11 km NNW of Mount Traine, 6 July 1984, K.R. Newbey 10365 (PERTH); 5 km NW of Shay Gap Settlement, 30 Oct. 1988, L. Thomson LXT 1180E–I (all PERTH).

*Distribution and habitat.* Occurs in north-west Western Australia where it ranges from the Pilbara eastwards to the Rudall River National Park in the Little Sandy Desert. In the Pilbara it extends from the vicinity of Marble Bar and Pardoo Station (at south western extremity of the Great Sandy Desert), south to Ethel Creek Station (north-east of Newman). A specimen in inflorescence bud collected on Barrow Island from a localized population of about 10 plants (B.R. Maslin 8804) appears to be referable to *A. robeorum*; however, future research is required to determine the provenance of these Barrow Island plants thereby confirming if they are recent naturalized introductions or indigenous to the island. Grows on skeletal sand or sandy loam (pH 6.5–7) over granite, laterite or quartz, in ‘Spinifex’ hummock grassland, sometimes along drainage lines.

*Flowering and fruiting period.* It is possible that flower initiation is dependant upon the timing and/or intensity of rainfall. Extant collections show plants in flower from August to September. Pods with mature seeds have been collected from late October to late November.



Figure 6. Holotype of *Acacia robeorum* Maslin (PERTH 07415893), scale = 5 cm.



*Conservation status.* Not considered rare or endangered. This species is recorded from the Rudall River National Park and Meentheena Conservation Park.

*Etymology.* The species name acknowledges Robe River Iron Associates who provided generous financial support to the study of Pilbara wattles through the West Angelas Coondewanna West Environmental Offsets Agreement. This support enabled the authors to undertake a five year study of the Pilbara *Acacia* flora which has resulted not only in the present paper but also in two soon to be published books and an electronic identification aid to these species. More recently Robe River Iron Associates through its assets manager Pilbara Iron, in collaboration with two other mining companies, has provided considerable financial support to a long term study of the complex *A. aneura* (Mulga) group.

*Affinities.* *Acacia robeorum* is a member of the '*A. victoriae* group' of species (see Maslin 1992 for discussion) within *Acacia* sect. *Acacia*. Other members of this group that occur in the Pilbara include *A. aphanoclada* Maslin, *A. cuspidifolia* Maslin, *A. glaucocaesia* Domin, *A. synchronicia* Maslin and *A. victoriae* Benth. The new species is most closely related to the more widespread *A. synchronicia* with which it is sometimes sympatric. The main distinguishing features between the two are given in Table 1 below. In the field *A. robeorum* is easily distinguished from *A. synchronicia* by its bright green, non-pruinose phyllodes which are thicker and more fleshy (they break with a clean snap when bent), and its yellowish to pale orange-brown or bronze, non-pruinose branchlets; in *A. synchronicia* the phyllodes are grey-green to glaucous and sometimes pruinose, more thinly textured (they do not break with a clean snap when bent) and the branchlets are darker coloured and commonly lightly pruinose at their extremities. Furthermore, *A. robeorum* commences flowering a month or more before *A. synchronicia*. The phyllodes of *A. robeorum* are normally narrower than those of *A. synchronicia*, however, there is overlap in this character and plants with phyllodes 3–4 mm wide need to be carefully examined in order to apply the names accurately. In *A. robeorum* the phyllodes are always clearly wrinkled when dry, their midrib and lateral nerves are either very obscure or superficially absent and the basal gland is not overly prominent. In narrow phyllode forms of *A. synchronicia* the dry phyllodes may also sometimes be wrinkled (but more finely so) with the nerves obscure or superficially absent, however, the basal gland is larger and more prominent. Furthermore, *A. synchronicia* often has some inflorescences which are paired within the phyllode axils (always single in *A. robeorum*), the seeds are mottled (not often mottled in *A. robeorum*), the pods are often slightly broader, the spiny stipules are generally longer (although on mature plants of both species it is not uncommon to find specimens without any stipules at all) and the phyllodes of the two species are differently shaped (Table 1).

*Notes.* The species was treated as *A. aff. victoriae* by Maslin (1981: 131) and as a narrow phyllode variant of *A. synchronicia* by Maslin (1992: 304, 2001: 379). *Acacia robeorum*, unlike its close relative *A. synchronicia*, is not a troublesome (increaser) plant for pastoralists in the Pilbara.

***Acacia steedmanii* Maiden & Blakely subsp. *borealis* Maslin, *subsp. nov.***

*Frutices* vel *arbores parvi*, *multicaules*, 1.5–4(–5) m *alti*, *corticis et ramis conspicue pruinosis* (saltem *plantis juvenibus*). *Phyllodia* *anguste elliptica* vel *oblanceolata*, (4–)5–8(–10) cm *longa*, (6–)8–15(–20) mm *lata*, *tenue texturata*, *glabra*, *costa et nervis marginalibus satis prominentibus*, *nervis lateralibus aliquantum perspicuis in statu sicco*, *manifeste anastomosantibus*, *apicibus plerumque obtusis*, *glandibus 2–3 supra margine superiore positis*. *Racemi* 10–40 mm *longi*; *capitula* *concinna*, *fragranti*, 40–50 *florifera*; *pedunculi* 2–4 mm *longi*, *glabri*, *aliquantum crassi*, *in statu sicco leviter vel aliquantum grosse longitudinaliter corrugati*. *Legumina* *linearia*, 4–12 cm *longa*, *plerumque 5–6 mm lata*, *glabra*, *supra seminis leviter elevata*, *plerumque inter semina leviter constricta*, *tenue texturata*, *atro brunnea*. *Semina* 4.5–6 mm *longa*, 2.5–3 mm *lata*, *a funiculo cremeo omnino circumdata*.



**Table 1.** Differences between *A. robeorum* and *A. synchronicia*

Character	<i>Acacia robeorum</i>	<i>Acacia synchronicia</i>
<b>Branchlets</b> (extremities; best observed when fresh)	Not pruinose. Yellowish to pale orange-brown or bronze.	Often lightly or conspicuously pruinose. Grey to light brown or greenish.
<b>Spiny stipules</b> (mature plants)	Absent or few; inconspicuous. 1.5–3(–4) mm long.	Absent or few and conspicuous. 3–10 mm long.
<b>Gland</b>	Not overly conspicuous. 0.4–0.5 mm long and the same across.	Rather conspicuous. (0.5–)0.7–1.3 mm long; 0.5–1 mm wide.
<b>Phyllodes</b>		
– width	(1–)2–3(–4) mm wide.	3–7 mm wide (8–11 mm in broad phyllode variant).
– shape	Linear to narrowly oblong or linear-oblongate.	Elliptic to narrowly elliptic or oblong-oblongate, infrequently narrowly oblong.
– colour	Bright green; not pruinose.	Glaucous to sub-glaucous, grey-green or silvery grey (pale green on new shoots).
– texture	Thick & fleshy (fresh); wrinkled when dry.	Thin or sub-fleshy when fresh; smooth or sometimes finely wrinkled when dry.
– midrib & lateral nerves	Absent or very obscure.	Evident (but not overly prominent), obscure or absent when phyllodes very narrow.
<b>Inflorescences</b>	Single in axil of phyllodes.	1 or 2 in axil of phyllodes.
<b>Pod width</b>	6–8(–9) mm wide.	(8–)9–12 mm wide.
<b>Seeds</b>	Black, not mottled or sometimes very obscurely mottled dark brown.	Mottled black and either yellow or light brown.
<b>Flowering period</b>	August to September.	September to December (Pilbara) but may commence in June/July in Kimberley.
<b>Distribution</b>	Pilbara to Rudall River National Park, Western Australia.	Widespread in Western Australia from Kimberley to Murchison district (including Pilbara), extending east to Northern Territory.

*Typus*: Little Sandy Desert, 8.2 km north-west of Cooma Well, 31.4 km south-south-west of Burranbar Pool on Savory Creek, 28.2 km east-south-east of Weelarrana Homestead, 22.5 km north-north-east of Moffetah Well, 12 October 1996, *S. van Leeuwen* 2858 (*holo*: PERTH 06782248; *iso*: K, MEL).

*Acacia steedmanii sensu* Maslin, *non* Maiden & Blakely (1928) in J. Jessup, *Fl. Central Australia* p.132 (1981).

*Acacia validinervia* Maiden & Blakely (Pilbara variant) *sensu* Maslin, *Fl. Australia* 11A: 279, figs 18D-F (2001).

Obconic *shrubs* or small *trees* 1.5–4(–5) m tall, crown rounded and open or dense, with numerous, slender, erect, main stems arising from ground level. *Bark* smooth and conspicuously pruinose on young plants, with age becoming grey and fibrous towards base of stems (where it more or less forms a stocking) with the upper branches red or yellow and frequently pruinose. *Branchlets* glabrous, slightly to moderately pruinose. *Phyllodes* narrowly elliptic to oblanceolate, uniformly and gradually narrowed towards the base, (4–)5–8(–10) cm long, (6–)8–15(–20) mm wide, rarely to 28 mm wide at the Rudall River (located outside the Pilbara region), thinly coriaceous, mostly wide-spreading, normally straight but a few shallowly recurved, glabrous, green or sub-glaucous; *midrib* and marginal nerves fairly prominent, lateral veins scarcely visible when fresh (except with transmitted light) but becoming evident upon drying, openly anastomosing (deflexed at their ends to intersect the marginal nerves); *apices* somewhat abruptly narrowed and obtuse, very rarely acute; *pulvinus* distinct, 4–7 mm long. *Glands* 2 or 3 on upper margin of phyllodes, the lowermost 0–3 mm above the pulvinus and normally 1 or 2 additional, often slightly raised glands near or above the centre of the phyllode. *Inflorescences* racemose or sometimes paniculate (especially at ends of branchlets); *racemes* 10–40 mm long, the axes glabrous; *peduncles* 2–4 mm long, glabrous, rather stout, finely to rather coarsely longitudinally wrinkled when dry; *heads* showy and fragrant, globular, 5–6.5 mm in diameter, bright golden, containing 40–50 densely arranged flowers. *Bracteoles* light- to mid-brown. *Flowers* 5-merous; *calyx* 3/4 length of corolla, very shortly dissected into inflexed, minutely ciliate lobes; *calyx tube* glabrous, dark red-brown when dry; *petals* c. 1.6 mm long, glabrous, 1-nerved. *Pods* linear, gently raised over seeds and normally slightly constricted between them (occasional deep constrictions occur on some pods), 4–12 cm long, usually 5–6 mm wide (see note under *Variation* below), with up to 12 seeds per pod, firmly chartaceous, straight to slightly curved, glabrous, dark brown. *Seeds* longitudinal in the pods, obloid-ellipsoid, 4.5–6 mm long, 2.5–3 mm wide, slightly shiny, black; *funicle* thread-like, cream-coloured, completely encircling the seed in a single or double fold (expanded length 30–40 mm long); *aril* cream-coloured. (Figure 7)

*Characteristic features.* Multi-stemmed, glabrous *shrubs* or small *trees*, the stems and branches conspicuously pruinose (at least on young plants). *Phyllodes* narrowly elliptic to oblanceolate, gradually narrowed towards the base, thin-textured, midrib and marginal nerves fairly prominent, lateral veins somewhat evident upon drying and openly anastomosing, apices normally obtuse. *Glands* 2 or 3 on upper margin of phyllodes. *Racemes* 10–40 mm long; *heads* showy and fragrant, 40–50-flowered; *peduncles* short (2–4 mm long), glabrous, rather stout, finely to rather coarsely longitudinally wrinkled when dry. *Pods* linear, gently raised over seeds and normally slightly constricted between them, mostly 5–6 mm wide, thin-textured, dark brown. *Seeds* 4.5–6 mm long, completely encircled by a cream-coloured *funicle* 30–40 mm long (expanded length).

*Selected specimens examined.* WESTERN AUSTRALIA: 3 mi [4.8 km] down Canning Stock Route from Pierre Spring [just east of Carnarvon Range], Aug. 1964, *W.H. Butler*, *R. Aitken* and *D. Hutchison* HA65 (PERTH); about 0.7 mi [1.1 km] SE of Curran Curran rockhole, near Rudall River, 23 May



Figure 7. Holotype of *Acacia steedmanii* Maiden & Blakely subsp. *borealis* Maslin (PERTH 06782248), scale = 5 cm.



1971, *A.S. George* 10839 (PERTH, TLF); upper Rudall River area near Curran Curran rockhole, 6 Sep. 1971, *B.R. Maslin* 2139 (CANB, G, K, MEL, NY, PERTH); 104 km NW of Newman on the road to Juna Downs, 9 July 1980, *B.R. Maslin* 4626 (BRI, CANB, MEL, NY, PERTH – distributed in 1980 as *A. validinervia*); about 10 km NE of Juna Downs Homestead on road to Karijini National Park, 5 Sep. 1995, *A.A. Mitchell* PRP 673 (PERTH); Little Sandy Desert, 22 Apr. 1979, *A.S. Mitchell* 514 (NT, PERTH); near Ranger's residence, Hamersley Range National Park, Aug. 1980, *E. & I. Solomon* 1 (PERTH); junction of Circular Pool Road and Juna Downs Road, Hamersley Range National Park, 20 Oct. 1988, *L. Thomson* LXT 1114 (PERTH); Mt Meharry, southern spur of main hill, c. 500 m S of trig station, 15.2 km SW of Goldsworthy's Packsaddle camp, 19 Apr. 1990, *S. van Leeuwen* 686 (PERTH); Munjina gorge area, 8 July 1983, *A.S. Weston* 13473A (PERTH).

*Distribution and ecology.* Occurs in the Pilbara region (restricted to the central Hamersley Range area) and further east where it is scattered though the Little Sandy Desert to the Rudall River National Park and near the Carnarvon Range. Grows in red sand on sandplains, on rocky scree slopes and around the edges of steep breakaways and cliffs. In the Pilbara it is found in skeletal, red, stony clay-loam over massive banded ironstone. It shows its best development (sometimes forming thickets) along floodplains, drainage lines and in water gaining sites. It is common along road verges and similar water gaining sites in many of the places where it occurs.

*Flowering and fruiting period.* Flowering extends from late June to early September with the main flush in July and August. Pods with mature seeds have been collected in mid-October and it would be expected that mature fruits would be found on the plants until November.

*Conservation status.* Not considered rare or endangered. This species is common within the Karijini National Park and has also been recorded from the Rudall River National Park.

*Etymology.* The species is named in honour of Harry Steedman (Hall 1978: 122). The subspecies name is derived from the Latin *borealis* (northern) and alludes to the distribution of this taxon relative to the typical subspecies.

*Common name.* This subspecies is sometimes called Roadside Wattle in the Pilbara, however, a more appropriate common name might be Northern Steedman's Wattle.

*Affinities.* *Acacia steedmanii* is a member of *Acacia* section *Acacia*. Subspecies *borealis* is most readily distinguished from the more southerly distributed typical subspecies (which occurs in the wheatbelt and adjacent goldfield region of south-west W.A.) by its longer seeds which have a longer funicle (in subsp. *steedmanii* the seeds are 3.5–4 mm long and the funicle is 8–12 mm long and extends only to about half way around the seed). The phyllodes of subsp. *steedmanii* are often more abruptly narrowed at the base than those of subsp. *borealis*, its peduncles are generally slightly longer (mostly 4–6 mm) and its heads generally have fewer flowers (mostly 30–40). Although the racemes of subsp. *steedmanii* are often about as long as subsp. *borealis* they normally range from 25–50 mm long with some extending up to 120 mm.

Subspecies *borealis* is related to *A. validinervia* which occurs further east in the ranges of central Australia (in far eastern W.A., north-west S.A. and central N.T.), which is distinguished by its thicker, generally wider phyllodes (mostly 15–40 mm) with a more pronounced reticulum, heads with more numerous flowers (50–80) and darker-coloured bracteoles, usually wider pods (7–8 mm), and wider seeds (3–5 mm) which are encircled by a generally shorter funicle (6–30 mm long, expanded length).

As noted below under *Variation*, the new subspecies had in the past been referred to *A. validinervia*, based primarily on the aberrant specimen (now attributed to subsp. *borealis*) with wide pods from the Little Sandy Desert at Rudall River.

Subspecies *borealis* is also related to an undescribed entity from the Little Sandy Desert that was called *A. aff. validinervia* in *Flora of Central Australia* (Maslin 1981: 133) and noted as a variant under *A. validinervia* in the *Flora of Australia* (Maslin 2001: 279). This entity is currently given the phrase name *Acacia* sp. Lake Disappointment (S. van Leeuwen 2865) and is characterized by its long phyllodes, large flower heads and spindly, whipstick growth form.

*Variation.* The only significant variant known is a specimen from the Rudall River area (*B.R. Maslin* 2139) that has pods 8–10 mm wide (twice the normal width of those found elsewhere on subsp. *borealis*). However, the seeds failed to develop and it is not known if this specimen represents a ‘good’ biological entity or whether unknown factors have caused the pods to become atypically wide. This specimen was described as *A. steedmanii* Maiden & Blakely in the *Flora of Central Australia* (Maslin 1981: 132) and was noted as a variant under *A. validinervia* Maiden & Blakely in the *Flora of Australia* (Maslin 2001: 279 – where *A.S. George* 10839 was erroneously cited as the voucher).

*Notes.* Subspecies *borealis* can resprout from a basal woody rootstock following fire. It probably has a relatively fast growth rate and regenerates from seed.

This is an attractive species with its white stems (at least when plants are young) and showy, fragrant, golden heads, and as such would be well-suited for amenity plantings and in home gardens in arid areas.

#### ***Acacia subcontorta* Maslin, *sp. nov.***

*Arbores* vel *frutices* effusi (1–)2–6(–8) m alti; *caules* aliquantum contorti; *rami* principales aliquantum contorti, horizontaliter effusi; *plantae juvenes* obconicae capitula sub-rotunda densa. *Ramuli* glabri (praeter surculos novos et interdum in axilli phyllodiorum maturum). Surculi novi resinosi pilis appressis pallido luteis ut argenteo albis mox mutatis. *Phyllodia* linearia vel angustissimo elliptica, 6–11 cm longa, (2–)3–5(–8) mm lata, moderate coriacea vel sub-rigida, recta vel leviter recurvata, *phyllodia adulescentia* cinereo-viridia vel subcaerulea indumento pilis appresso argenteo-albis, maturitate viridia et glabra vel subglabra, subtiliter multi-striata nervis numerosis parallelis ornata, nervo marginali resinoso et luteolo et rubro-brunneo; *apices* acuti vel acuminati, curvati vel uncinati. *Inflorescentiae* plerumque simplices; *pedunculi* 2–6(–8) mm longi, in statu florescentia sparse vel modice dense pilosi, in statu fructo glabri vel sub-glabri; *spicae* aureae vel pallido aureae, 20–35 mm longae, gemmis leviter resinosis; *receptaculum* pilis sparsis vel modice densis effusis nitidis albis vel pallido luteis (rare pallido aureis) ornatum sed in fructu glabrum. *Flores* 5-meri; *calyx* ad dimidium dissectus; *petala* glabra. *Legumina* 1–7 cm longa, 6–9 mm lata, anguste oblonga vel linearia, turgida vel sub-teretia, coriaceo-crustacea vel lignosa, glabra vel (in statu juvenili) appresse pilosa. *Semina* in legumine longitudinalia, oblonga vel elliptica, 5–7 mm longa, 4–5 mm lata, atro brunnea vel nigra; *arillus* ceraceus, albus.

*Typus:* Balfour Downs Station, c. 15 km south of Talawana Track turnoff, 22° 51' 22.1" S, 120° 46' 58.8" E, Western Australia, 1 June 2004, *B.R. Maslin* 8535 (*holo:* PERTH 06792197; *iso:* CANB, G, K, MEL, NSW, NY).



*Acacia* sp. Balfour Downs (B.R. Maslin 8526), in Council of Heads of Australasian Herbaria, *Australian Plant Census*, <http://www.anbg.gov.au/chah/apc/index.html> [accessed 19 February 2008].

Multi-stemmed *shrubs* or *trees* (1–)2–6(–8) m tall, crowns ± rounded, sub-dense (sparser on oldest plants) and spreading (1–)3–5 m across, trunks somewhat contorted and reaching about 10–15 cm diameter at breast height, main branches somewhat contorted and ± horizontally spreading, young plants obconic with a dense sub-rounded crown. *Bark* grey, thin, fibrous and finely longitudinally fissured on trunks and main branches. *Branchlets* terete, obscurely ribbed, light brown at extremities, glabrous (except new shoots and sometimes in axil of mature phyllodes). *New shoots* green, resinous (but not sticky), pale yellow sericeous (often intermixed with some microscopic, red-brown resin hairs) when young but the hairs soon becoming silvery white, the indumentum sometimes obscured by resin when shoot is first initiated. *Stipules* caducous. *Phyllodes* linear to very narrowly elliptic, 6–11 cm long, (2–)3–5(–8) mm wide, moderately coriaceous to sub-rigid, rather wide-spreading to ascending or ± erect, straight to very shallowly recurved, commonly with a thin layer of non-sticky resin, adolescent phyllodes grey-green to bluish with a distinct silvery sheen due to an indumentum of appressed silvery white hairs (indumentum most dense on youngest phyllodes), oldest phyllodes green and glabrous or sub-glabrous; finely multistriate, anastomoses absent, the *nerves* very close together, of uniform prominence or the central one slightly more evident than the rest; *marginal nerve* discrete, resinous, yellowish or red-brown; *apices* acute to acuminate, curved to uncinately, innocuous; *pulvinus* 2–3 mm long, yellow to yellow-brown and transversely wrinkled when dry. *Gland* not prominent but sometimes slightly raised above margin, situated on upper margin of phyllode 0.5–1(–3) mm above the pulvinus, circular, 0.3–0.6 mm in diameter, often brown (when dry). *Inflorescences* simple or sometimes rudimentary racemes (with 2 spikes) to 2 mm long; *peduncles* 2–6(–8) mm long, sparsely to moderately densely hairy when in flower (hairs mostly appressed to sub-appressed but sometimes patent), glabrous or sub-glabrous when in fruit; *spikes* numerous and showy, 20–35 mm long, golden to light golden, buds slightly resinous and densely flowered (i.e. flowers close together) but becoming sub-densely flowered at anthesis (more space between the individual flowers so that the receptacle is often seen); *receptacle* puberulous with sparse to dense, spreading, white or pale yellow (rarely light golden) hairs but often glabrous when in fruit. *Bracteoles* linear-spathulate, *c.* 1 mm long, equal in length to calyx, the claws linear, the laminae *c.* 0.5 mm wide, inflexed and slightly thickened. *Flowers* 5-merous, rather small (petals *c.* 1.5 mm long), slightly resinous (but not sticky); *calyx* 1/3 to 1/2 length of corolla, dissected for *c.* 1/2 its length into oblong, sparsely hairy lobes which are inflexed and slightly thickened abaxially at apex, as flowers mature the sepals may sometimes irregularly split (sometimes to the base); *petals* glabrous, nerveless or very obscurely 1-nerved; *ovary* densely white tomentulose. *Pods* narrowly oblong to linear, flat but turgid to ± sub-terete, straight-edged or very shallowly constricted between seeds (occasional deep constrictions may occur on a few pods), 1–7 cm long, 6–9 mm wide, coriaceous-crustaceous to woody, glabrous or appressed-hairy (hairs white, moderately dense to sub-sparse and often embedded in a resinous, non-sticky, matrix when young), straight to shallowly or strongly curved, occasionally irregularly sigmoid or openly coiled, dark brown; *marginal nerve* not or scarcely thickened, yellow to light brown. *Seeds* longitudinal in pods, obloid to ellipsoid, large (5–7 mm long, 4–5 mm wide), compressed (3 mm thick), very dark brown to almost black, dull except slightly shiny at the centre (associated with areole); *areole* narrowly oblong to narrowly elliptic, 1.5–2 mm long, *c.* 0.7 mm wide, slightly shiny; *pleurogram* continuous, bordered by a ± obscure, narrow, very slightly raised, sometimes slightly shiny band of tissue; *funicle* filiform and folded beneath a thickened, waxy terminal *aril* which is white except light green (when fresh) at attachment to seed. (Figure 8)

*Characteristic features.* Multi-stemmed, spreading *shrubs* or *trees* with rather crooked stems, main branches somewhat contorted and ± horizontally spreading. *New shoots* green, resinous (but not sticky),



Figure 8. Holotype of *Acacia subcontorta* Maslin (PERTH 06792197), scale = 5 cm.



pale yellow sericeous when first initiated with the hairs soon becoming silvery white, indumentum sometimes obscured by resin when shoot is first initiated. *Phyllodes* linear to very narrowly elliptic, mostly 3–5 mm wide, moderately coriaceous to sub-rigid, straight to very shallowly recurved, adolescent phyllodes grey-green to bluish with a distinct silvery sheen due to an indumentum of appressed silvery white hairs (densest on youngest phyllodes), ageing green and glabrous or sub-glabrous; finely multistriate with numerous, parallel *nerves*, marginal nerve resinous and yellowish or red-brown, apices acute to acuminate and curved to uncinat. *Peduncles* relatively short (2–6(–8) mm long); *spikes* showy, golden, buds slightly resinous; *receptacle* with sparse to moderately dense spreading white or pale yellow (rarely light golden) hairs but often glabrous when in fruit. *Pods* 6–9 mm wide, turgid to ± sub-terete, coriaceous-crustaceous to woody, glabrous or appressed white-hairy (hairs often embedded in a resin when pods young), dark brown. *Seeds* large (5–7 × 4–5 mm), very dark brown to almost black.

*Selected specimens examined.* WESTERN AUSTRALIA: Gibson Desert Nature Reserve, 4 May 1999, *N. Burrows* 2/99/27 (PERTH); between Thryptomene Hill and Mt Samuel on Gunbarrel Highway, 3 July 1983, *D.J. Edinger* 106 (PERTH); Troy Creek headwaters, NW of Granite Peak Homestead, NE of Wiluna, 20 May 1999, *M. French* 844 (PERTH); Ashburton Botanical District – eastern extremity: 27.5 km NE of Carnegie Homestead on Gunbarrel Highway to Warburton, 7 Sep. 1984, *B.R. Maslin* 5640 (K, PERTH) and 5640A (NSW, NT, PERTH); Gibson Desert: about 10 km E of Mount William Lambert on Gunbarrel Highway, 8 Sep. 1984, *B.R. Maslin* 5647 (PERTH); Ethel Creek Station (NE of Newman), 61.3 km from Newman – Marble Bar road on road to Balfour Downs Station, 31 May 2004, *B.R. Maslin* 8526 (CANB, K, MEL, NSW, PERTH); about 10 km due W of Giles Point (located at W extremity of Ophthalmia Range), on ‘Giles Road’, 2 June 2004, *B.R. Maslin* 8550 (DNA, PERTH) and 8551 (PERTH); 12.7 km from Weelarrana Hsd on a bearing of 58 °, 20 June 1996, *A.A. Mitchell* PRP1155 (NT, PERTH); Lorna Glen Station, Oct. 1984, *K. Thomas* 2 (PERTH); 31.5 km E of Mt Ella, 29 Sep. 1998, *S. van Leeuwen* 4143 (PERTH); Balfour [Downs Station], 22 May 1983, *K. Walker* 257 (PERTH).

*Distribution and ecology.* Occurs in Western Australia where it has a scattered distribution from the Pilbara region south to Lorna Glen Station (about 150 km north-east of Wiluna) then east to Thryptomene Hill in the Gibson Desert (about 600 km east-north-east of Wiluna); *A. thoma* Maslin (see below) shows a somewhat similar distribution pattern. In the Pilbara region *A. subcontorta* occurs on Balfour Downs and Ethel Creek stations (north-east of Newman) and also in the Hamersley Range near Giles Point, about 150 km to the west (a similar disjunction between the Hamersley Ranges and the Balfour area also occurs in *A. bromilowiana* and *A. catenulata* subsp. *occidentalis*, see above). *Acacia subcontorta* is often common in the places where it occurs.

Within the Pilbara this species grows on stony hardpan plains that are typically characterised by very shallow red-brown loamy soils with a surface mantle of ironstone pebbles and cobbles over a consolidated ferruginous hardpan. These hardpans are typically found on gently undulating plains or between extensive Mulga groves. The hardpans tend to be characterised by overland sheet flows of water and are thus run-off sites; in the Pilbara these sites occur in the Zebra, Spearhole, Washplain and Wanna Munna Land Systems (Van Vreeswyk *et al.* 2004). Further south in the eastern Gascoyne district and adjacent deserts, *A. subcontorta* is also associated with hardpan habitats although the soils appear to be somewhat sandy, especially in the Lorna Glen and Carnegie area. These hardpans may contain calcareous elements and where drainage is more defined, or where there exists a drainage foci such as a clay pan, *A. subcontorta* may occur on the fringing sandy levee banks. Open Mulga woodlands, characteristically grove-intergrove Mulga, with limited ‘Spinifex’ understorey forms the typical vegetation association in which this new species occurs.

*Flowering and fruiting period.* Flowers from May to July and pods with mature seeds have been collected from late August to mid-October.

*Conservation status.* Not considered rare or endangered. Known from the Gibson Desert Nature Reserve and well represented in the proposed Mulgalands Conservation Park.

*Etymology.* The species name is derived from the Latin *sub* (somewhat) and *contortus* (twisted) referring to the form of the stems and main branches.

*Affinities.* *Acacia subcontorta* belongs to *Acacia* sect. *Juliflorae* and has affinities with *A. citrinoviridis* Tindale & Maslin which is common in parts of the Pilbara. *Acacia citrinoviridis*, however, is most readily distinguished by its broader pods (10–15 mm wide) which are densely citron sericeous (this colour is most evident on young pods, the hairs may turn silvery white as the pod matures); also, it has more obviously falcate phyllodes that are normally broader (mostly 7–13 mm wide) with yellow (never red) marginal nerves. The habit and habitat of *A. citrinoviridis* are also different from that of *A. subcontorta*. *Acacia citrinoviridis* normally has a single, straight main trunk, attains a height of 3.5–12(–18) m tall and is normally found on the banks and adjacent floodplains of major river systems (infrequently along minor water courses). *Acacia subcontorta* is multi-stemmed and commonly of lower stature, has somewhat contorted main branches and favours drier hardpan sites. Narrow phyllode forms of *A. catenulata* subsp. *occidentalis* may superficially resemble *A. subcontorta* (see subsp. *occidentalis* above for discussion); these two taxa are sympatric near Giles Point on the Wanna Munna Flats in the Hamersley Range, and in the absence of pods care needs to be taken not to confuse the two taxa.

*Acacia subcontorta* is also related to *A. xanthocarpa* R.S. Cowan & Maslin which occurs in the Murchison region south of the Pilbara and which is currently under review. Plants regarded as typical *A. xanthocarpa* are readily distinguished from *A. subcontorta* by their terete phyllodes and more thinly textured pods with an indumentum of spreading, straight or crisped yellow hairs (the hairs ageing white).

*Variation.* There appears to be considerable variation in the growth form of this species. In better sites (i.e. along drainage lines) it may grow to a small tree reaching 6–8 m in height (e.g. *B.R. Maslin* 8526) but on drier sites such as hardpan plains (e.g. in places on Balfour Downs Station) it appears to be more shrubby, ranging in height from 1–3 m tall. These differences in stature are most likely related to the depth of the hardpan and the ability of such soils to retain water and nutrients.

***Acacia subtiliformis* Maslin, *sp. nov.***

*Frutices* erecti, debiles, glabri, 2.5–3.5 m alti. *Ramuli* lenticellulosi. *Stipulae* persistentes, parvae, erectae, appressae, saepe in resina inclusae. *Phyllodia* asymmetricaliter oblonga vel oblongo-elliptica, parvula, 2–3.5(–5) mm longa, 1.2–1.8 mm lata, l:w = 1–2.3; *costa* non prominens; *apices* cuspidate brevi gracili rigida abrupte terminati; *pulvinus* indistinctissimus. *Inflorescentiae* simpliciae; *pedunculi* 6–8 mm longi, basim ebracteati; *capitula* globosa, dense 40–50-flora. *Flores* 5-meri; *sepala* libra. *Legumina* anguste oblonga, applanata sed supra semina rotundata et plerumque inter-semina leviter constricta, 20–40 mm longa, 3–4 mm lata, firme chartacea, stipitata, acuta. *Semina* in legumen longitudinalia posita, elliptica, parva (c. 3 mm longa, c. 2 mm lata), turgida, nigra sed sordide pallido-lutea variegata; *funiculus* filiformis, exarillatus.

*Typus:* Ophthalmia Range, Western Australia [precise locality withheld for conservation reasons], 2 June 2004, *B.R. Maslin* 8552 (*holo:* PERTH 06869556; *iso:* K, MEL).



*Acacia* sp. Calcrete Hamersley Range (B.R. Maslin 8564), in Council of Heads of Australasian Herbaria, <http://www.anbg.gov.au/chah/apc/index.html> [accessed 18 February 2008].

Erect, spindly (wispy), single-stemmed *shrubs* 2.5–3.5 m tall, crown openly branched, stems about 1.5 cm diameter at breast height, the upper branches scarred where phyllodes have fallen. *Branchlets* terete, glabrous, light brown or red-brown but soon ageing grey, finely ribbed (rib most evident immediately below insertion of phyllodes), lenticellate (lenticels scattered, circular, dull yellow), resinous (but not sticky). *Stipules* persistent, narrowly triangular, 0.7–1.5 mm long, 0.2–0.3 mm wide at base, erect and appressed to branchlets, often enveloped and obscured by resin, dark brown. *Phyllodes* asymmetrically oblong to oblong-elliptic, lower margin  $\pm$  straight, upper margin often shallowly convex, very small, 2–3.5(–5) mm long (include mucro), 1.2–1.8 mm wide, l:w = 1–2.3, sub-crowded, slightly thickened, wide-spreading, straight, glabrous, green; *midrib* not prominent, slightly raised (when dry) and extending from pulvinus to mucro, often with a less pronounced nerve parallel to midrib on its upper side (rarely also on lower side); *apices* rounded and abruptly terminated in a short (0.3–0.5 mm long) but distinct, excentric, slender, rigid, subulate, pungent, straight or shallowly recurved, brown point; *pulvinus* very indistinct (rudimentary or seemingly absent), to 0.2 mm long, yellowish. *Gland* not prominent, situated on upper margin of phyllode 1–1.5 mm above the base (near to, or below, centre of phyllode). *Inflorescences* simple, 1 per axil; *peduncles* glabrous, 6–8 mm long, dark red (at least when fresh), base ebracteate; *heads* globular, c. 5 mm in diameter (when dry), densely 40–50-flowered, golden. *Bracteoles* sub-peltate, 1–1.2 mm long, the claws linear, puberulous on margins and adaxially, the laminae sub-circular, inflexed at right angles to claw, slightly thickened and fimbriolate (hairs straight and silvery white). *Flowers* 5-merous; *sepals* 2/3–3/4 length of petals, free to base, shape, size and indumentum same as bracteoles; *petals* 1.5 mm long, glabrous, free, very obscurely nerved; *ovary* glabrous. *Pods* narrowly oblong, flattened but rounded over seeds,  $\pm$  straight-edged or slightly constricted between seeds, 20–40 mm long, 3–4 mm wide, firmly chartaceous, straight, glabrous, slightly shiny, brown to greyish brown, sometimes slightly pruinose, the marginal nerve narrow, stipitate (stipe c. 3 mm long), apex acute. *Seeds* longitudinal in pods, ellipsoid, small (about 3 mm long and 2 mm wide), turgid (2 mm thick), slightly shiny, black but mottled dull pale yellow, with a narrow band of dull pale yellow tissue bordering the pleurogram and around the periphery of the seed; *areole* very small (c. 0.3 mm long and the same across), located near centre of seed, dull yellow; *pleurogram* very obscure, ‘u’-shaped; *funicle* filiform, not expanded into an *aril*, c. 2 mm long, reddish brown. (Figure 9)

*Characteristic features.* Erect, spindly, wispy, single-stemmed, glabrous *shrubs*, the upper branches scarred where phyllodes have fallen. *Branchlets* lenticellate, resinous (but not sticky). *Stipules* persistent, very small, erect, appressed to branchlet and often obscured by resin. *Phyllodes* asymmetrically oblong to oblong-elliptic, lower margin  $\pm$  straight, upper margin often shallowly convex, very small (2–3.5(–5)  $\times$  1.2–1.8 mm, l:w = 1–2.3), sub-crowded, green; *midrib* not prominent; *apices* terminated in a short but distinct, excentric, slender pungent point; *pulvinus* very indistinct. *Inflorescences* simple, 1 per axil; *peduncles* dark red (when fresh), base ebracteate; *heads* globular, 40–50-flowered. *Sepals* free. *Pods* narrowly oblong, flattened but rounded over seeds and  $\pm$  straight-edged or slightly constricted between seed, rather small (20–40  $\times$  3–4 mm), firmly chartaceous, stipitate. *Seeds* small (c. 3  $\times$  2 mm), black but mottled pale yellow, areole very small (c. 0.3  $\times$  0.3 mm), *funicle* filiform and not expanded into an aril.

*Selected specimens examined.* WESTERNAUSTRALIA: [precise localities withheld for conservation reasons] Hamersley Range: 8 Sep. 1995, N.E. Casson & E.M. Mattiske MCPL 1060 (PERTH); Oct. 1992, J. Fox 7626 (PERTH, photocopy of sheet ex Curtin University); 2 June 2004, B.R. Maslin 8552 (K, MEL, PERTH); 2 June 2004, B.R. Maslin 8564 (PERTH); 13 Oct. 2004, B.R. Maslin 8699 (MEL, PERTH); 2 Aug. 2006, E. Thoma 1153 (NSW, PERTH).

Figure 9. Holotype of *Acacia subtiliformis* Maslin (PERTH 06869556), scale = 5 cm.

*Distribution and ecology.* Known from only six populations within the Hamersley Range, namely, four from the Hancock Range and two in the Ophthalmia Range. See under *Conservation status* below for population sizes at these localities. *Acacia subtiliformis* occurs in low undulating country on calcareous rises adjacent to drainage lines. Soil analysed from one of the Ophthalmia Range populations was shown to be very low in total phosphorus, relatively high in exchangeable calcium and measured pH 8.9 (S. van Leeuwen, pers. comm.). The dominant vegetation at most sites is characterised by *Eucalyptus mallees* over scattered *Melaleuca* and *Petalostylis* shrubs over scattered hard 'Spinifex'.

*Flowering and fruiting period.* Flowers in July and August. Pods with mature seeds have been collected in mid-October.

*Conservation status.* *Acacia subtiliformis* is listed as Priority Three under DEC Conservation Codes for Western Australian Flora (Atkins 2008). Current evidence shows this species as having a very restricted distribution within the Hamersley Range where it is known from only six disjunct populations (see *Distribution and ecology* above), none of which is located within the Karijini National Park but two of which are within the proposed Mulgalands Conservation Park. Plant numbers exceed 10,000 in one of the Hancock Range populations and 100 in another; more than 10,000 plants occur in one of the Ophthalmia Range populations. Three of the extant populations are located within the disturbance footprint of existing iron ore mining operations or the infrastructure corridors associated with such operations and the largest known population in the Hancock Range could be adversely impacted by changes in surface and underground hydrological regimes associated with mine dewatering and reinjection.

*Etymology.* The species name is derived from the Latin *subtilis* (thin, slender, fine) and *forma* (shape, figure) in reference to the characteristic wispy, spindly growth form of the species.

*Affinities.* A member of *Acacia* sect. *Acacia* and most closely related to *A. minutissima* (see above); these two species are closely related to *A. maitlandii* which is readily distinguished from both by its much longer phyllodes (i.e. 7–25 mm). See *A. minutissima* above for further discussion.

*Notes.* *Acacia subtiliformis* has a very distinctive wispy growth form and there are a number of taxa scattered throughout the Pilbara region which are similar in this regard. Some, like *A. aphanoclada*, *A. orthocarpa* F.Muell. and *A. subtiliformis* warrant formal taxonomic status because they possess characters other than growth form which set them apart from their closest relatives. However, wispy variants are also known to occur in *A. bivenosa* DC. and *A. hamersleyensis* but based on current knowledge these entities appear not to warrant formal recognition.

***Acacia thoma* Maslin, sp. nov.**

Frutices multicaules (1.5–)2–3.5 m alti. *Ramuli* versus extremitates argenteo sericei. *Phyllodia* angustissime elliptica, interdum anguste linearia, 5–8(–10) cm longa, 2–3(–4) mm lata, erecta, sub-rigida, recta vel leviter incurva, argenteo pallido ravidio viridia, pilis argenteo appressis ut demum limitatus ad inter-nervos, subtiliter et uniformiter multi-striata; *apices* innocui. *Inflorescentiae* simplices; *pedunculi* 3–6 mm longi, resinosi, minute argenteo-sericei, interdum in fructu glabri; *spicae* 10–25 mm longae, pallido aureum, floribus in spicos nec praecipue dense dispositis. *Flores* 5-meri; *calyce* minutus, longitudinale 1/5–1/4 corollae partes aequantia, 1/2–3/4 divisus irregulariter in lobis ± oblongis vel late triangularibus; *petala* 1.3–1.4 mm longa, glabra. *Legumina* sub-moniliformia, 20–60 mm longa, 2–3 mm lata, firme tenuiter crustacea, resinosa, minute argenteo sericea, obscure



longitudinaliter nervata. *Semina* in legumine longitudinaliter ordinata, anguste ellipsoidea, 4–5 mm longa, 1.5–2 mm lata; *arillus* pusillus, albus.

*Typus*: Mount Channar Range, 24 km south-east of Paraburdoo, Western Australia, 6 August 2006, E. Thoma 1026 (*holo*: PERTH 07398409; *iso*: CANB, G, K, MEL, NSW).

Multi-stemmed, rounded or obconic *shrubs* (1.5–)2–3.5 m tall and 3–4 m across, crowns sparse to sub-dense, main stems and branches often sub-contorted. *Bark* grey, smooth but becoming rough and longitudinally fissured at base of mature stems. *Branchlets* terete, very finely (and obscurely) ribbed with silvery, appressed, straight hairs between the ribs at the extremities, soon glabrous. *New shoots* light green (the youngest phyllodes often brownish or tinged yellow but drying dark-coloured), resinous but not sticky. *Stipules* rudimentary, caducous, present only on very young new shoots. *Phyllodes* narrowly linear to very narrowly elliptic, 5–8(–10) cm long, 2–3(–4) mm wide, flat, coriaceous, sub-rigid, erect, straight to shallowly incurved, with short, straight, closely-appressed, silvery white hairs over the entire surface on uppermost phyllodes but indumentum becoming confined to between the nerves with age (the hairs difficult to see without magnification), sub-glaucous, dull green (with a slight bluish tinge) to silvery light greyish green; multistriate with numerous, very fine, slightly resinous *nerves* of uniform prominence; *apices* straight to curved or occasionally uncinat, narrowed to a small, blunt, brown callosity; *pulvinus* indistinct, 1–2 mm long, finely transversely wrinkled when dry. *Gland* minute and indistinct, situated on upper margin of phyllode 0–2 mm above the pulvinus. *Inflorescences* (few seen) simple, 1 or 2 within axil of phyllodes; *peduncles* 3–6 mm long, appressed silvery-white hairy with the hairs sometimes confined to lower half of peduncle and often obscured by resin, sometimes glabrous when in fruit; *spikes* 10–25 mm long, light golden, the flowers not especially densely arranged within the spikes (best observed in mature bud), the buds slightly resinous but not sticky; *receptacle* glabrous. *Bracteoles* sub-peltate, very small (about same length as calyx). *Flowers* 5-merous; *calyx* minute, 1/5–1/4 length of corolla, irregularly divided for 1/2–3/4 its length into ± oblong or broadly triangular, minutely and sparsely ciliolate lobes; *petals* 1.3–1.4 mm long, joined for 1/2–2/3 their length (the free portion recurved following dehiscence), glabrous, nerveless. *Pods* sub-moniliform (i.e. terete to sub-terete, gently raised over seeds and shallowly to moderately constricted between them), 20–60 mm long, 2–3 mm wide, thinly coriaceous-crustaceous, straight to very shallowly curved, resinous but not sticky, brown, minutely silvery sericeous between the obscure, longitudinal nerves; *marginal nerve* discrete (but not thickened) and yellowish. *Seeds* longitudinal in the pods, narrowly ellipsoid to narrowly obloid-ellipsoid, 4–5 mm long, 1.5–2 mm wide, shiny, dark brown; *pleurogram* commonly bordered by a diffuse band of dull yellow tissue; *areole* ‘u-’ or ‘v-’ shaped, open towards the hilum, very small (0.2–0.5 mm long); *funicle* folded beneath the small, white *aril*. (Figure 10)

*Characteristic features.* Multi-stemmed *shrubs*. *Branchlets* silver-sericeous towards extremities. *Phyllodes* narrowly linear to very narrowly elliptic, mostly 5–8 cm long and 2–3 mm wide, finely multistriate with nerves of uniform prominence, with silvery appressed hairs that become confined to between the nerves with age (hairs difficult to see without magnification and often obscured by resin). *Peduncles* short (3–6 mm long) and appressed-hairy; *spikes* golden with flowers not especially densely arranged. Flowers small (petals 1.3–1.4 mm long); calyx irregularly dissected for 1/2–3/4 its length, minute (1/5–1/4 length of corolla). *Pods* sub-moniliform (i.e. terete to sub-terete, gently raised over seeds and shallowly to moderately constricted between them), short and very narrow (20–60 × 2–3 mm), obscurely longitudinally nerved, minutely silvery sericeous between nerves. *Seeds* narrowly ellipsoid to narrowly obloid-ellipsoid, 4–5 mm long.



Figure 10. Holotype of *Acacia thoma* Maslin (PERTH 07398409), scale = 5 cm.

*Selected specimens examined.* WESTERN AUSTRALIA: Leinster, 25 Aug. 1996, *G. Cockerton* 1542 (PERTH); Great Northern Highway, 12.3 km N of Meekatharra, 11 Oct. 2006, *R. Fairman* 257 (PERTH); Little Sandy Desert, Mt Nossiter, 125 km NE of Carnegie HS on Gunbarrel Highway to Warburton, 7 Sep. 1984, *B.R. Maslin* 5645 (NSW, PERTH); Mt Channar SE of Paraburdoo, 2 June 2006, *B.R. Maslin* 8781 (K, MEL, NSW, PERTH); 10 km NE of Leinster, adjacent to Leinster Nickel Operation gate house, May 2005, *P. Parkinson* LCS 12856 (AD, CANB, DNA, K, MEL, MO, NSW); Mt Channar, 22 Oct. 2005, *E. Thoma* 857 (PERTH); Mt Channar area, 9 Sep. 1984, *P.A.S. Wurm* 1522 (PERTH).

*Distribution and ecology.* Occurs in Western Australia where it has a scattered distribution from the Pilbara region south to Meekatharra and Leinster and extending east to Mt Nossiter in the Little Sandy Desert (*A. subcontorta* shows a somewhat similar distribution pattern, see above). In the Pilbara *A. thoma* is confined to the Mt Channar region (Eastern Range), east of Paraburdoo where it occurs in two areas (about 15 km apart), both of which contain a few small, discontinuous populations that extend over a distance of about 1 km. It is likely that further collecting throughout the range of this species will show it to be more common than current knowledge indicates; *A. thoma* is rather difficult to identify in the absence of pods. In the Pilbara *A. thoma* grows in skeletal soil on ridges and rocky slopes towards the base of banded ironstone hills, in open shrubland with common associates including *Acacia aneura*, *A. sibirica*, *A. rhodophloia*, *A. tetragonophylla*, *Eremophila jucunda* and *E. fraseri*. At its more southerly localities *A. thoma* is also normally associated with rocky habitats, for example, at Leinster it is reported to occur in soil over ironstone, ultramafic rocks in association with Mulga shrublands (see *G. Cockerton* 1542), while at Mt Nossiter it is reported to grow in a 'rocky habitat' but the rock type was not identified (see *B.R. Maslin* 5645). The Meekatharra collection (*R. Fairman* 257) was gathered from a road verge situation in 'dry red soil', and the underlying rock type was not identified.

*Flowering and fruiting period.* This species appears to flower in response to summer rainfall events. Plants in flower have been collected in May and June and pods with mature seed have been collected from August to October.

*Conservation status.* Not considered rare or endangered. However, it is noted that the species is currently not known to be represented on the Western Australian conservation estate.

*Etymology.* This species is named for Emil Thoma, Botanical Advisor with Pilbara Iron. Emil has worked in the Pilbara region for 30 years during which time he has provided the authors with much assistance (particularly in the form of specimens and information) concerning the *Acacia* flora of that region. Apart from *Acacia* Emil has been instrumental in documenting the distribution of numerous Declared Rare and Priority Flora species in the Pilbara region, has recorded many new plant records for the region and has collected several novel taxa including *Ptilotus subspinescens*. The epithet 'thoma' is used here deliberately as a noun in apposition, thus requiring no change by the addition of a case ending.

*Common name.* Thoma's Wattle (suggested new common name).

*Affinities.* *Acacia thoma* belongs to *Acacia* sect. *Juliflorae* and appears to be most closely related to the more southerly distributed *A. effusifolia* Maslin & Buscumb (syn. *A. coolgardiensis* Maiden subsp. *effusa* R.S.Cowan & Maslin); indeed, Cowan and Maslin (1995: 22) treated the Pilbara occurrence of *A. thoma* as a northern outlier of subsp. *effusa*. *Acacia effusifolia* comprises two informal variants



which are distinguished on the basis of their peduncle length and it is the variant with pedunculate spikes that most closely resembles *A. thoma* but which is most readily distinguished in the following ways: main stems fluted with at least some vertical furrows and folds (stems not fluted in *A. thoma*), peduncles invested with red-brown resin hairs additional to the silvery-white appressed orthodox hairs (resin hairs not present in *A. thoma*), flowers larger (petals about 1.8 mm long) and more densely arranged in the spikes, calyx much longer ( $1/2 - 2/3$  length of corolla) with the sepals normally free (or sometimes shortly united at the base), pods not or scarcely constricted between the seeds and seeds slightly shorter (3–4 mm long) and differently shaped (i.e. obloid). Additionally, there are subtle differences in the phyllode nerves (broader in *A. effusifolia* than in *A. thoma*) which suggests underlying anatomical differences between the two. Although there is overlap in the range of variation for phyllode size between the two taxa, *A. effusifolia* often has longer phyllodes (to 14 cm long).

In the Pilbara region *A. thoma* is most similar to *A. sibirica* S.Moore (syn. *A. stowardii* Maiden) as the two species are often similar in habit and phyllode shape and size, and both have pedunculate spicate inflorescences. *Acacia thoma* and *A. sibirica* are sometimes sympatric and special care is needed not to confuse them, at least when pods are not present on the plants. Fruiting specimens are easy to distinguish because *A. sibirica* has narrowly oblong, flat pods which are 3–5(–7) mm wide, whereas those of *A. thoma* are sub-moniliform,  $\pm$  terete and narrower (2–3 mm wide). Indumentum is another character that enables these two species to be distinguished; in *A. sibirica* the branchlets, phyllodes and peduncles are glabrous whereas in *A. thoma* these structures are invested with silvery-white appressed hairs (see above description). However, the hairs in *A. thoma* are not especially obvious and specimens must be carefully examined at  $\times 10$  magnification or above to see them. The calyx of *A. sibirica* is also different from that of *A. thoma* in being longer, broader at its base and less deeply dissected into broadly triangular lobes. Some flat-phyllode forms of Mulga (*A. aneura* F.Muell. ex Benth.) may also superficially resemble the new species (and may grow sympatrically with it) but are readily distinguished by their broader, flat pods and linear, free sepals; also, the phyllode nerves of these Mulgas are resinous and normally more obvious than those of *A. thoma*.

#### ***Acacia trudgeniana* Maslin, sp. nov.**

*Frutex* (0.5–)2–5 m altus, caulis principalibus 1 vel 2 strictis vel fractuosis instructis; *ramulis* lateralibus breves et patuli. *Cortex* suberosus, crassus. *Ramuli* glabri, non pruinosi. *Stipulae* spinosae sed frequente tantum bases in vetuste persistentibus. *Phyllodia* (15–)30–50 mm longa, (8–)15–30(–37 mm lata, inaequilater ovata vel elliptica aut raro obovata, coriacea, undulata, distincte sub-glaucous (sed non pruinosa), demum obscure viridia, costa ad marginem inferiore posita, nervis minoribus reticulum compactum fasciens; *apices* brevi-acuminati et cuspidati. *Inflorescentiae* racemosae; *axes racemi* 3–15 cm longi, glabri, obscure purpureo rubri; *pedunculi* plerumque volubiles, glabri, obscure purpureo rubri; *capitula* globularia; *flores* 20–25, pallido aurei. *Bracteoli* absentes. *Flores* 5-meri; *gemmis* obscure purpureo rubri; *sepala* libra vel sub-libra, linearia vel anguste oblonga; *petala* enerves. *Legumina* et semina non vidi.

*Typus*: about 27 km due east of Newman, 14 km east of Newman–Marble Bar road on Shovelanna Road, then 2.3 km along Jimblebar Road on north side of railway, 23° 20' 32" S, 120° 00' 28" E, Western Australia, 12 October 2004, B.R. Maslin 8686 (*holo*: PERTH 06927750; *iso*: CANB, K, MEL).

*Acacia* sp. Mount Hilditch (M.E. Trudgen 19134), in Council of Heads of Australasian Herbaria, *Australian Plant Census*, <http://www.anbg.gov.au/chah/apc/index.html> [accessed 19 February 2008].

Erect *shrubs* (0.5–)2–5 m tall, with 1 or 2, straight or crooked main stems from ground level (plants appearing  $\pm$  gnarled when stems crooked), the lateral branches short and wide-spreading. *Bark* corky, thick, longitudinally furrowed, light grey (but surface often blacked by fire) except dull pale yellow in furrows. *Branchlets* terete, finely ribbed, glabrous, light brown to dull yellow tinged orange (often dull pale green at extremities), not pruinose. *New shoots* light green. *Stipules* spiny but often only the bases persisting (as blunt knob-like protuberances) with age, 4–8 mm long, patent, straight, brown, rigid. *Phyllodes* inaequilaterally ovate to elliptic or rarely obovate, upper margin prominently rounded and much longer than the shallowly convex to shallowly sigmoid lower margin, (15–)30–50 mm long, (8–)15–30(–37) mm wide, coriaceous, undulate, distinctly sub-glaucous (but not pruinose), ageing dull green; *midrib* evident (but not raised), excentric (near lower margin), yellow (when dry); the *minor nerves* forming a close reticulum; *apices* short-acuminate and ending in a short, straight, rigid, brown, spiny, excentric cusp 1–3 mm long. *Gland* situated on upper margin of phyllode at distal end of pulvinus, 1–2 mm long, not raised. *Inflorescences* (few seen) elongated racemes that extend beyond the phyllodes, 1 or sometimes 2 per axil; *raceme axes* 3–15 cm long, dull purplish red, glabrous; *peduncles* 7–20(–25) mm long, twinned (rarely 3) and often with a phyllode within their angle (these phyllodes are initiated as small, bract-like structures), glabrous, dull purplish red; *heads* globular, light golden, 20–25-flowered, (the purplish red petals may be seen between the exerted anthers). *Bracteoles* absent. *Flowers* 5-merous, glabrous, dull purplish red when in bud; *sepals* slightly less than 1/2 length of petals, free or almost so, linear to narrowly oblong; *petals* 2 mm long, nerveless, glabrous. *Pods* and *seeds* not seen. (Figure 11)

*Characteristic features.* Erect *shrubs* (0.5–)2–5 m tall, with 1 or 2, straight or crooked main stems and short, wide-spreading lateral branches, plants appearing  $\pm$  gnarled when main stems crooked. *Bark* thick and corky. *Branchlets* not pruinose. *Stipules* spiny but often only the bases persisting with age. *Phyllodes* very asymmetric with midrib situated near lower margin, minor veins forming a net-like reticulum, coriaceous, undulate, sub-glaucous (but not pruinose) ageing dull green, terminated by a needle-sharp tip. *Inflorescences* long-racemose (3–15 cm long); *raceme axes*, *peduncles* and *flower buds* dull purplish red; *heads* 20–25-flowered. *Sepals* free. *Flowering* commencing in September/October.

*Other specimens examined.* WESTERNAUSTRALIA: N of Winning Pool, 11 Oct. 1941, *C.A. Gardner* 6232 (PERTH); about 35 km due E of Newman, 15.5 km E of Newman–Marble Bar road on Shovelanna Hill Road (parallel to Jimblebar Road on N side of railway line), 31 May 2004, *B.R. Maslin* 8520 (PERTH); Ethel Creek Station (NNE of Newman), 31 May 2004, *B.R. Maslin* 8525 (PERTH); Balfour Downs Station, 1 June 2004, *B.R. Maslin* 8541 (PERTH); about 1 km due E of The Governor, Hamersley Range, 3 June 2004, *B.R. Maslin* 8559 (PERTH); Yanrey Station (S of Onslow), 6 Oct. 2004, *B.R. Maslin* 8636A (NSW, NT, PERTH); Barrow Island, 27 July 2006, *B.R. Maslin* 8800 (PERTH); Balfour Downs Station, 12 Aug. 2006, *B.R. Maslin* 8856 (PERTH); Mt Meharry, 14 Oct. 1983, *P. Ryan s.n.* (PERTH 00165328); near Ranger’s Residence, Hamersley Range National Park, 26 Sep. 1980, *E. & I. Solomon* 9 (PERTH); 4.3 km NW of Mt Montagu, 8 Apr. 1997, *M.E. Trudgen* MET 15011 (PERTH); 2.5 km N of The Governor, Hamersley Range, 23 Sep. 1997, *M.E. Trudgen* MET 18366 (PERTH); 5.2 km SSE of Mt Montagu, 16 May 1997, *M.E. Trudgen* MET 19134 (PERTH); 20.3 km SW of Mt Bruce, Karijini National Park, 6 Aug. 1998, *S. van Leeuwen* 3627 (PERTH); 0.6 km SSW of Packsaddle Hill, Hamersley Range, 22 Sep. 1997, *A. Weston* 20196 (PERTH).

*Distribution and ecology.* Of scattered occurrence in north-west Western Australia where it extends from Winning and Yanrey Stations located inland from Exmouth Gulf, north-east through the Hamersley Range to Balfour Downs Station in the eastern Pilbara region; it also occurs north of the Hamersley Range near Mt Montagu in the Millstream-Chichester National Park, from the Yule



Figure 11. Holotype of *Acacia trudgeniana* Maslin (PERTH 06927750), scale = 5 cm.



River crossing on North West Coastal Highway south of Port Hedland, and from Barrow Island off the Pilbara coast. A sterile specimen (*K. McCreery* GIR 01-03, PERTH) from Giralia Station at the bottom of Exmouth Gulf may be this species, however, more complete material is needed to check its identification. Commonly forms small, localized populations in the places where it occurs. Grows on red sand or brown loam with a mantle of ironstone pebbles over 'Spinifex' ground cover, on flat or low-undulating plains.

*Flowering and fruiting period.* Flowering commences between early September and early October but because of the paucity of specimens it is not known when it ceases (perhaps around December). Pods have not been seen.

*Conservation status.* Not considered rare or endangered. Recorded from Barrow Island Nature Reserve and represented in the Millstream–Chichester and Karijini National Parks.

*Etymology.* This new species is named for Malcolm Trudgen, botanist, who has a particular interest in the Pilbara and the family Myrtaceae. Over the past 30 years Malcolm has collected extensively in the Pilbara during the course of his many vegetation and flora surveys of that area (e.g. Trudgen & Casson 1998; Trudgen 2002). It was Malcolm who first drew our attention to the existence of this new species, although he was not the first to collect it.

*Common name.* Trudgen's Wattle (suggested new common name).

*Affinities.* *Acacia trudgeniana* is a member of *Acacia* sect. *Acacia* and is most closely related to *A. inaequilatera* Domin and can be easily confused with this species on account of its thick corky bark, spiny stipules, coriaceous, reticulately-veined, spine-tipped phyllodes which are markedly asymmetric (midrib near lower margin), brightly coloured, long racemes, peduncles and petals, and its free sepals. However, *A. inaequilatera* is most readily distinguished by its pruinose branchlets, pruinose, often more blue-grey phyllodes, slightly more flowers per head (30–40), earlier flowering period (May–August) and its generally more gnarled, diffuse growth form. The two species grow in close proximity in some places but are not known to be sympatric. *Acacia inaequilatera* is far more common in the Pilbara than *A. trudgeniana*. *Acacia marramamba* Maslin is also related to *A. trudgeniana* but is distinguished by having a more straggly growth form, non-corky bark, sparingly and openly anastomosing minor nerves on the phyllodes and brownish red raceme axes, peduncles and flower buds. These three species along with *A. pyrifolia* DC. and *A. strongylophylla* F.Muell. (which does not occur in the Pilbara) comprise the informal '*A. pyrifolia* group'.

*Variation.* A dwarf form of this species, 0.5 m tall, occurs at one locality on Barrow Island; the phyllodes on this entity are smaller than normal (15–25 mm long, 8–10 mm wide). A superficially similar small phyllode form occurs on Legendre Island in the Dampier Archipelago (*R.D. Royce* 7287 PERTH) but habit details are unknown for this plant. On the mainland, plants with smallest phyllodes are found on a few specimens from West Angelas (25–35 mm long and 10–20 mm wide).

*Notes.* A fire-tolerant species with its thick protective bark and its ability to resprout by epicormic growth following burns. Also has the capacity to resprout after the above ground biomass has been removed through bulldozing and other clearing operations. One plant of *A. trudgeniana* has been observed to emit a delicate, faint honey odour (?from flowers) in the heat of the afternoon. This species provides good wildlife protection and bird nests have been observed in a number of plants.

**Acacia walkeri** Maslin, *sp. nov.*

*Frutex* debilis glaber (1–)2–2.5(–3.5) m altus. *Ramuli* pallido brunnei vel rubri, resinosi, plerumque viscidii, lenticellulosi. *Stipulae* persistentes, minutae, erectae, in resina inclusae. *Phyllodia* acicularia, quadrangularia vel plana, (8–)10–20(–30) mm longa, 0.5–1.2 mm lata, rigida, recta, plerumque sub-glaucua vel ± glauca, infrequenter pallido viridia, semper 4-nervata, costa ± prominens ubi phyllodia plana; ad *apicem* versus cuspidem acutam strictam leniter attenuata. *Inflorescentiae* simplices; *pedunculi* 10–15(–20) mm longi, graciles; *capitula* globularia, in statu vivo 5–6 mm diam. *Flores* 5-meri; *sepala* libra, lineari-spathulata. *Legumina* sub-moniliformia, (20–)30–50 mm longa, 3 mm lata, firme vel tenuiter coriacea. *Semina* atrobrunnea vel nigella et marmorato cremea; *funiculus* filiformis, nec in arillo expansus.

*Typus*: About 90 km due east-south-east of Newman on Jigalong road, 23° 23' 23" S, 120° 30' 59" east, Western Australia, 11 August 2006, B.R. Maslin 8845 (*holo*: PERTH 07415753; *iso*: CANB, K, MEL, NT).

*Acacia maitlandii* aciculiform variant *sensu* Maslin, in J. Jessup, *Fl. Central Australia* p. 129 (1981) and *Fl. Australia* 11A p. 388 (2001).

*Acacia* sp. Gunbarrel (B.R. Maslin 5665), in Council of Heads of Australasian Herbaria, *Australian Plant Census*, <http://www.anbg.gov.au/chah/apc/index.html> [accessed 19 February 2008].

Spindly and sometimes straggly, erect, glabrous *shrubs* (1–)2–2.5(–3.5) m high, with 1 or 2 slender stems from ground level, stems 4–5.5 cm diameter near base, typically openly branched with sparse foliage but sometimes bushy, phyllodes occasionally crowded at ends of branches. *Bark* light grey, smooth. *Branchlets* light brown to red, resinous, often viscid, lenticellate, scarred where phyllodes have fallen. *Stipules* persistent, triangular, minute (0.5–1 mm long), erect, brown, often enveloped by resin. *Phyllodes* acicular, linear, quadrangular-terete to flat, (8–)10–20(–30) mm long, 0.5–1.2 mm wide, with l:w=30, rigid, patent to slightly inclined, straight, normally sub-glaucous to ± glaucous, infrequently pale green, not pruinose, 4-nerved (one on each face and one on each margin when flat), midrib ± prominent and raised on flat phyllodes when dry; gradually narrowed at *apices* into a very sharp, rigid, straight, brown cusp *c.* 1 mm long. *Inflorescences* simple, single or 2 within axil of phyllodes; *peduncles* straight, slender, spreading, rarely exceeding the phyllodes, yellow (often light brown when dry), 10–15(–20) mm long, basal peduncular bracts absent; *heads* showy, globular, 5–6 mm in diameter when fresh, light golden to mid-golden, with 40–60 flowers. *Flowers* 5-merous; *sepals* free, linear-spathulate, *c.* 3/4 length of petals; *petals* 1.6 mm long. *Pods* sub-moniliform, rounded over seeds and constricted between them, (20–)30–50 mm long, 3 mm wide, firmly chartaceous to thinly coriaceous, straight or almost so, reticulately nerved but nerves not or scarcely evident, light brown. *Seeds* longitudinal in the pods, obloid to obloid-ellipsoid, 3–3.5 mm long, 2–2.5 mm wide, dull, dark brown to blackish and mottled cream, with cream-coloured tissue bordering the *pleurogram* and bordering the periphery of the seed; *fimicle* thread-like and not expanded into an *aril*. (Figure 12)

*Characteristic features.* Erect, spindly, glabrous *shrubs* with 1 or 2 slender stems from ground level. *Branchlets* light brown to red, resinous, often viscid, lenticellate. *Stipules* persistent, minute, erect, often embedded in resin. *Phyllodes* acicular, mostly 10–20 mm long, very narrow (0.5–1.2 mm wide), rigid, straight, normally sub-glaucous to ± glaucous, infrequently pale green, quadrangular-terete to flat, 4-nerved, midrib ± prominent when phyllodes flat; *apices* gradually narrowed to a very sharp, straight cusp. *Inflorescences* simple; *peduncles* straight, slender, spreading, rarely exceeding the phyllodes,

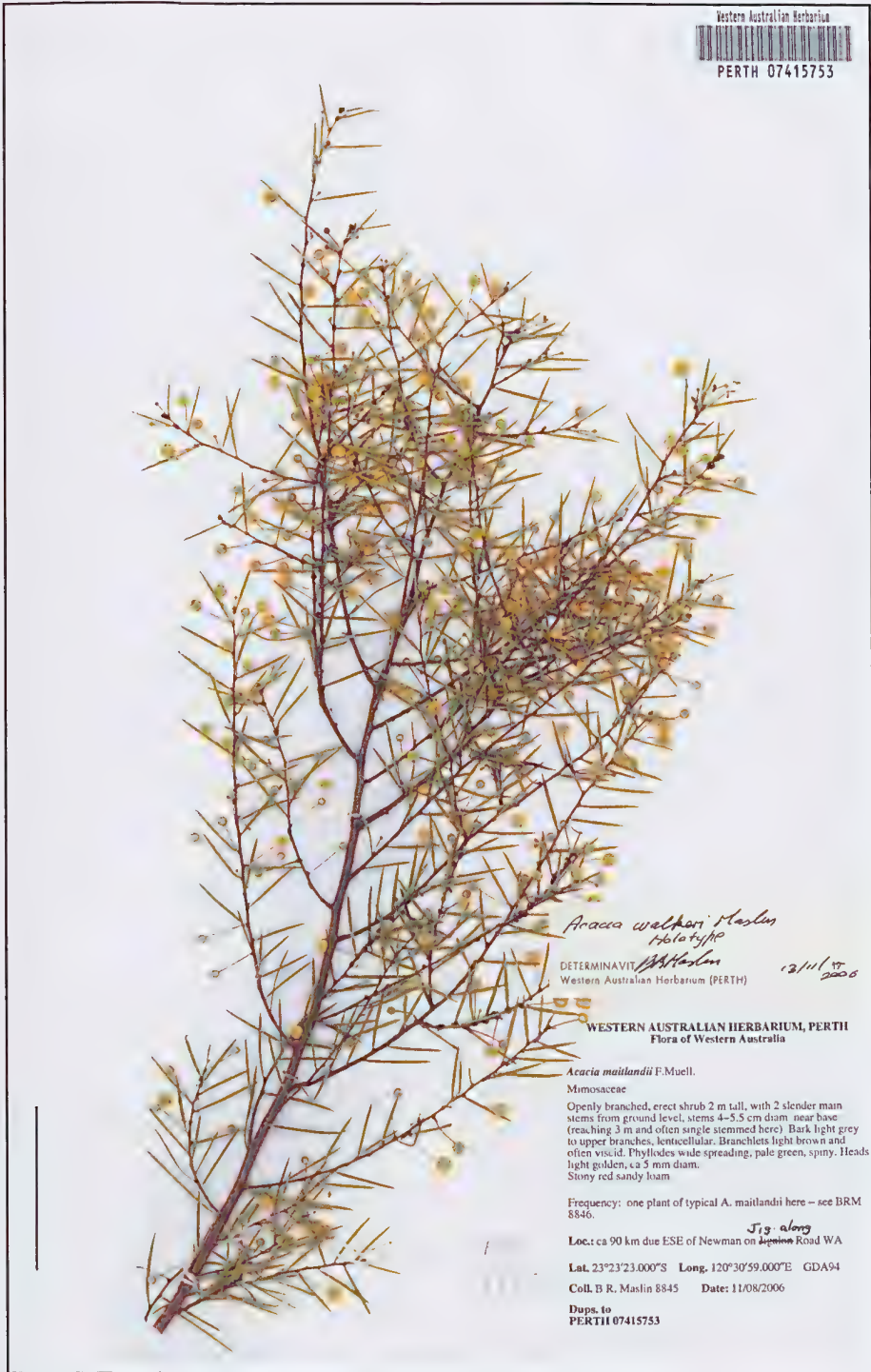


Figure 12. Holotype of *Acacia walkeri* Maslin (PERTH 07415753), scale = 5 cm.



yellow (often light brown when dry), 10–15(–20) mm long; *heads* globular, 5–6 mm in diameter when fresh. Sepals free, linear-spathulate. *Pods* sub-moniliform, 3 mm wide, narrow, thin-textured. *Seeds* dark brown to blackish and mottled cream; *funicle* thread-like and not expanded into an aril.

*Selected specimens examined.* WESTERN AUSTRALIA: Great Victoria Desert, 338 km by road NE of Laverton, Warburton road, 17 Sep. 1978, *A.C. Beaglehole & E.G. Errey* ACB 60073 (PERTH); road west of Rawlinson Range, 25 June 1960, *J.B. Cleland s.n* (PERTH 00113778).; 52 km W of Warburton Mission, 18 Nov. 1978, *H. Demarz* D7228 (PERTH); on track towards Carnarvon Range, 35 km from Old Mary Mia, on N edge of Miss Fairbairn Hills, in proposed Carnarvon Range Conservation Park, SW edge of Little Sandy Desert, 23 Aug. 1999, *D.J. Edinger* Nats 2 (PERTH); 10 miles [16 km] E of Todd Range, Gunbarrel Highway, 1 Oct. 1966, *A.S. George* 8199 (PERTH); Rawlinson Range, c. 32 miles [51 km] W of Giles, 3 Oct. 1966, *A.S. George* 8268 (PERTH); entrance to Glen Cumming, Rawlinson Range, 21 July 1967, *A.S. George* 8850 (AD, NSW, PERTH); Giles Settlement, in Rawlinson Range, c. 70 km west of Northern Territory border, 29 July 1964, *R. Hill* 1384 (PERTH ex AD); Gibson Desert, 13 km E of Todd Range along Gunbarrel Highway, 12 June 1983, *S.D. Hopper* 2826 (PERTH); 4 km E [of] Lake Christopher, Rawlinson Range, 23 July 2001, *P.K. Latz & G.J. Morse* 17959 (PERTH ex NT); 52 miles [83 km] W of Giles, 21 Sep. 1969, *J.R. Maconochie* 810 (PERTH ex NT); Gibson Desert, 140.5 km by road SE of Mt Everard on 'Heather Highway' which intersects Gunbarrel Highway just SE of Lake Breaden, 9 Sep. 1984, *B.R. Maslin* 5661 (CANB, K, PERTH, distributed as *A. maitlandii*); Keartland district, Savoury Creek, 8 June 1984, *G.J. Morse* 82 (PERTH ex CANB).

*Distribution and ecology.* Confined to the Western Australian arid zone where it extends from the western edge of the Little Sandy Desert and Pilbara regions eastwards through the northern Great Victoria Desert and southern Gibson Desert to the Central Ranges near the border of Northern Territory and South Australia. *Acacia walkeri* is rare in the Pilbara where it is known from just a single, large population about 90 km east-south-east of Newman (the type population). It is recorded from red sand plains and rocky slopes in gravel and lateritic soils (sandy loam or clayey sand), with other shrubs and 'Spinifex'.

*Flowering and fruiting period.* Flowering has been recorded from June to October with peak flowering in August and September. Pods with mature seeds have been collected in October and November.

*Conservation status.* Not considered rare or endangered. However, it is noted that the species is not known from the Western Australian conservation estate.

*Etymology.* This new species is named for Mr Ken Walker who has collected many plants (over 600) from the Pilbara during the past 30 years. Ken made the first ever collection of *A. subcontorta* Maslin (see above) and has undertaken many specific collections of Pilbara acacias on our behalf. Ken was a founding contributor to the (now disbanded) Pilbara Regional Herbarium and has been instrumental in improving standards of landform and vegetation rehabilitation, and weed control on mine sites, throughout the region.

*Common name.* Walker's Wattle (suggested new common name).

*Affinities.* *Acacia walkeri* is a member of *Acacia* sect. *Acacia* and is very closely related to *A. maitlandii* F.Muell.; indeed, the new taxon was noted as a narrow phyllode variant of *A. maitlandii* by Maslin (1981: 129, 2001: 388). The two species sometimes grow together (e.g. in the Pilbara region a single plant of *A. maitlandii*, *B.R. Maslin* 8846, was found in the large population of *A. walkeri* from which the type was collected) but hybrids are not known to occur. *Acacia maitlandii* can be distinguished

from *A. walkeri* in having broader phyllodes, (1.5–)2–4(–5) mm wide, which are differently shaped ( $\pm$  asymmetrically narrowly elliptic to oblong-elliptic or oblong-obovate) and consistently flat and green, larger flower heads (c. 9 mm in diameter when fresh) and normally broader pods that measure (3–)4–5(–10) mm wide. Future studies may show that *A. walkeri* would be better treated as a subspecies of *A. maitlandii*. *Acacia walkeri* could possibly be confused with *A. tetragonophylla* F.Muell. ex Benth. if only new shoots are present on the latter. At mature nodes in *A. tetragonophylla* the phyllodes are clustered in groups of 2–6 but on new shoots the phyllodes occur singly at the nodes as they do in *A. walkeri*. In cases where only new shoots of *A. tetragonophylla* are present that species can be recognised by its 5-nerved phyllodes (4-nerved in *A. walkeri*), caducous stipules and non-lenticellate branchlets; *A. tetragonophylla* also has much larger, curved to coiled pods with the seeds encircled by a bright orange-red or yellow aril.

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